The Builder.

VOL. LIV. No. 2338. SATURDAY, APRIL 14, 1888.

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An Average County under the Local Government Bill.

A FURTHER examination of the Local Government Bill in its separate clauses and provisions has not diminished the sense of its importance which we felt on its introduction, inasmuch as it forms a framework of local government in England which people can fill up as they please, and if we say England we mean Wales and England without distinction. The Welsh people are now by blood relationship and extensive association in trade, in agriculture, in war, in science, and in art one with the English in whatever may befall,—a fate which they willingly accept. The hardships they have formerly undergone at the hands of a too rude neighbour are now almost forgotten under the welcome they have long received in England, and it is to be hoped that what traces of bad feeling do remain may altogether vanish before long.

The area of England and Wales is 37,239,351 acres; the population of the last census was 25,974,439; that is, ten acres to seven persons, or an average of 1·43 acres per head of population.

The 37,239,351 acres are divided into fifty-four counties, if we call each of the Yorkshire Ridings a separate county, which, for all municipal purposes, it is. The average area of the counties is, therefore, 689,618 acres, and the average population 481,008. Some much exceed the average and some are much less, but there is one, the county of Derby, which is not only approximately of the average area, but contains exactly the average number of acres per person, viz., 1·43 acres. The population of Derbyshire at the last census was 461,914, and the area is 658,624 acres.

In order to see the bearing of the Local Government Bill on a single county, we desire to take an instance of a county of approximately average population, and we might take for this purpose Lincolnshire, with a population of 469,919, but as the area is 1,767,879 acres, there are 3·76 acres per person; or Norfolk, with a population of 444,749, but as the area is 1,356,173 acres there are 3·05 acres per person; or Northumberland, with a population of 434,086 and an area of 1,290,312 acres, but here again there are 2·97 acres each person, on the average; or Somersetshire, with a population of 469,109 and an area of 1,049,812 acres. the proportion being 2·24; or, lastly, we might take Sussex, with a population of 490,505 and an area of 933,269, the proportion being 1·90 to 1. But we select Derbyshire because it is not only of average size and average population, but its industry partakes of nearly all the industries of the country,—manufacturing, mining, and farming; with all the attendant industries upon these. Moreover, it is in the middle of England.

It is not stated in the Bill what proportion of population will constitute an electoral division of a county returning one member to the County Council; this is to be determined by the Local Government Board hereafter, but it appears, by the number 10,000 being mentioned in connexion with another subject, that that might possibly be contemplated as the most desirable number. However that may be, it appears to be in itself a desirable number for several reasons. It would approximately represent the population of a ward of a borough, though in the largest towns most of the wards are more populous. It would not be possible, or desirable if it were so, to fix a number which shall neither be exceeded in some cases nor fallen short of in others. Any number fixed upon can only be a guide to the judgment of those who will make the electoral divisions; but if the population of each electoral division were 10,000 it would give to the County Council of Derbyshire fifty-seven elected councillors. In the first place, the county town, Derby itself, contains a population of 81,168. There are two other boroughs in the county, Chesterfield containing 12,221, and Glossop 19,574. The population of these three boroughs is 112,963. Deducting these from the whole number in the county there would remain a population of 348,951. There are in the county twelve urban districts, which contain together a population of 89,668, being an average of 7,472, and none of these varies much from the average. In these urban districts the average number of persons per acre is 2·35, not many for an urban area, but it shows that the boundaries have been laid so as to provide for an increase of population. Deducting these 89,668 from the 348,951 there remains a population of 259,283. There are twelve other so-called "urban" districts, the population of which is only 28,587, averaging 2,382 each. The average number per acre is less than one; so, putting the case the other way, each person has an average area of 1·17 acres. These twelve places are too small to be dealt with separately, and we must suppose several of them to be combined to form an electoral division, returning one county councillor. Being existing urban districts, so constituted under the Local Government Act of 1858, they could not be included in the rural electoral divisions; at least, it would appear so. Deducting their population of 28,587 from the 259,283, there remains a rural population of 230,696. These are contained in nine existing rural sanitary districts, the average area per person being 2·51 acres.

Derby has eight wards, averaging a little more than 10,000 each in population. They are unequal, but whether any alteration of their boundaries would be desirable would be settled by the general scheme; and perhaps equality of numbers would not be attained, although kept in view as a principle of representation; but supposing that the borough would send eight councillors to the County Council, Chesterfield two, and Glossop two, the twelve urban districts twelve, and the twelve smaller urban districts six councillors; and the nine rural districts twenty-seven, the whole number of elected councillors (fifty-seven) would be apppoximate to that of the town council of a large borough at present; and the whole county would be represented as follows:—

	Population.	Number of elected Councillors.
The county town	81,168	8
Two boroughs, each two members	31,795	4
Twelve urban districts	89,668	12
Twelve ditto	28,587	6
Nine rural districts.....	230,696	27
	461,914	57

It is satisfactory to see in the Bill that the Chairman of a County Council must be qualified to be a Justice of the Peace for the county, and that, moreover, "he shall, by virtue of his office, be a Justice of the Peace for the county." The chairman of a District Council need not be a Justice of the Peace in order to be qualified for appointment, nor will his office of chairman confer that distinction upon him. He is to be appointed for three years. All the elected councillors will be elected for three years, and the whole number will retire together at the end of that time, and their places be filled by a new election. The persons entitled to vote at an election of councillors for a district are those who will vote at the election of county councillors, and this applies to the rural as well as to the urban districts of a county. Every county is to be

divided into districts, in each of which there is to be a District Council. By clause 41, every Urban Sanitary District existing at the time of the first election of a District Council under the new Act will continue to be an Urban District, subject to any alteration which may be made under the Act; and, subject to the same provision, every Rural Sanitary District existing at the time of the first election of a District Council under the Act will continue to be a Rural District, provided that where the district overlaps the county boundary the overlapping portion will be dealt with by a scheme which is to be prepared in that behalf. Where the district of a county is a borough, the Town Council will be the District Council, retaining its existing name and the titles of mayor, aldermen, and town councillors. Where a Sanitary District is not a borough the District Council is to consist of a chairman and councillors, incorporated by the name of the council of the district; and a District Council which is not the corporation of a borough is to be constituted and elected in all respects as the council of a borough is, and it is to conduct its proceedings as the council of a borough does, and is to have a similar position, except that in lieu of the selected councillors being called aldermen they are to be called selected councillors, while those elected by the ratepayers are to be called elective councillors. The wards of a borough are to be wards of the county district.

With regard to the Rural County Districts, at present presided over by Boards of Guardians, every existing Rural Sanitary District is to have a Rural District Council. It will be divided into wards, and the number of elective councillors for each ward is to be three, or a multiple of three, and so is the number of councillors of the Rural District Council. The divisions, however, are not to be called wards, but electoral divisions. In boroughs large enough to return more than one member to the County Council, the divisions are to be made by the Town Council. It is not expressly stated that they are to be the wards of the borough, but it will probably come to that, or at any rate we suppose that would be the system of division most in favour with Town Councils. In the rest of the county the divisions are to be made by the Court of Quarter Sessions.

There are several large ironworks in Derbyshire, and these, with the extensive coal-mines and ironstone mines near them, afford employment to a great number of people. There are two populous parishes adjoining each other,—Eckington, with an area of 7,425 acres, and a population of 11,094, and Staveley with an area of 6,872 acres, and a population of 8,194, together 19,288, or an average of 1·34 to the acre. Each of these might suitably be made an electoral division of the county.

If they were not separately dealt with, and if the whole rural population of 230,696 were represented by twenty-seven county councillors, the average number of each electoral division would be 8,544. This would not be much affected by making each of these two parishes a separate electoral division, for, deducting their population of 19,288 from the 230,696, there would remain 211,408 to be represented by twenty-five members of the County Council, or an average population of 8,456; and either of these numbers would perhaps be large enough in the rural districts, being in area, on the average, about 21,000 acres each; for the average area per head of the population in these districts is 2·51 acres. But in the case of a single parish which has a population equal to or greater than the average, it might be desirable to take it separately, its boundaries being well defined, and also in order to introduce as little disturbance as possible of local arrangements of long standing, where they have been found suitable to the locality;—unless for superior reasons, which, in some cases, it would not be difficult to find. But as to the twelve small Local Board districts we have mentioned, the case is quite different; they are not of long standing, nor are they large enough to have each a separate local government.

If the respective numbers of county councillors were apportioned as above stated, there would be about an equal division of representatives between the urban and the rural populations in Derbyshire.

NOTES ON BUILDERS' AND CONTRACTORS' PLANT.

BY M. POWIS BALE.

THE judicious selection of plant is, without doubt, often a very important factor in the successful carrying out of a contract, and, unless carefully undertaken, the purchaser may find himself saddled with a quantity of costly machinery, more or less ill-adapted to his requirements. What is to be desired is, the most advanced machinery, adapted as far as may be to the special class of work in which the purchaser may be engaged. The object to be attained is the dispensing with, or the reduction of, skilled labour to its lowest possible limit. Building and contracting has such a variety of branches that, within the scope of this paper, I cannot do more than briefly notice the machines most generally in use, with some of the points of construction to be desired in each, the more special kinds of machinery, such as stone-working, being left, perhaps, for some other occasion. The hints given, it is hoped, may be of some service to purchasers, but must be taken as general, and not arbitrary under all circumstances.

Steam Cranes.

Steam cranes of various types,—chiefly of the jib and derrick class,—have long been used for bridge and other heavy contracting work, but of late years they have come largely into use for the erection of buildings. In this latter case they are usually mounted on staging run up to about the height of the intended building, and so placed that they can receive their loads from the roadway, and by means of a swivelling jib place them in the best position for further manipulation. In buildings of any magnitude, or in crowded neighbourhoods, where quick despatch is necessary, there is little doubt they can be worked with considerable economy.

Many good cranes, especially adapted for this class of work, have been constructed, and also many bad and even dangerous ones.

It may not be out of place to give here a few notes on the points to be desired in a good crane for this work, but the writer desires it to be understood that he does not refer to any particular make of crane, but simply gives his opinion, and nothing more.

In selecting a crane,—in fact, any kind of plant,—the buyer should not be led away by a very low price, as he may rest assured he will only get what he pays for, *i.e.*, if he pays a poor price he will get a poor article. This may appear old advice, but in these days of excessive competition I do not think it unnecessary.

In the first place, the boiler should have ample steaming capacity, and be in excess of what is absolutely necessary for the engine, so that a good head of steam may be kept up without forcing the fire. As there is no fixed rule as to the area of heating-surface per horse-power, buyers will do well to compare the sizes of different makers when purchasing, and they will probably find a disparity, some makers giving 10, or 12, or more square feet per nominal horse-power, whilst others are content to give 8 ft. Although they are rather slower in steaming, cross-tube boilers are, perhaps, to be preferred to vertical tubular, as they are more readily cleaned, and are less liable to burning and leakage. This is more particularly the case if the feed-water is hard, and contains much lime or other incrusting matters.

The boiler should be mounted on a water-tank foundation-plate, as the water is thus warmed before entering the boiler; at the same time it acts as a counter-weight.

In cranes of recent construction the jib and working parts are mounted on a strong cast-iron carriage made in one piece, it being claimed for this arrangement that greater rigidity is secured than is the case with wrought-iron carriages. The centre post on which the crane turns should, however, be of wrought iron, and of ample section. The crane should be arranged to hoist, lower, or swivel by steam, and, in certain cases, it may be made to traverse also; but in ordinary building this latter motion is not required. Double-cylinder engines are generally to be preferred to single-cylinder. The jib should, by preference, be of wrought iron, although some users prefer a wooden jib, which material is largely used in derrick cranes. Pitch pine is usually employed; it should be thoroughly sound and free from faults, and fitted with heads and shoes. The head bolts, too, should be of ample strength, and where timber is used they and the timber should be carefully examined periodically, as when subject to the action of the weather dangerous decay may be going on and remain undetected. In fact, the author had recently to give evidence in a case in which weak bolts and inferior timber in a derrick-crane brought about a fatal result. In extensive building operations derrick-cranes with very long jibs (sometimes as long as 80 ft.) and great radius, have come largely into use of late years.

As these can be arranged with a sweep or radius of about three-fourths of the circle, it can be seen at a glance that a large saving of labour may be effected in placing materials in position. Pitch-pine of the best quality is suitable for the jib, stays, and sleepers, with oak for the upright. If a considerable weight has to be lifted the jib should be made double and the stays trussed to the sleepers. On dock and extensive works the crane can be made to travel with advantage. To secure this in the case of derrick cranes the crane is mounted on a travelling carriage running on one pair of rails, whilst the stays and sleepers are supported by another carriage running on another pair of rails parallel to them. Where the crane is used for lifting light and heavy loads single and double purchase gear is usually fitted, but in lieu of this some makers fit only a single motion, and lift heavy loads by double chain. It is claimed for this arrangement that as there are less working parts they are less liable to get out of order. When much light lifting has to be done an extra winding barrel can be fitted with advantage; this should be of tolerably large diameter, and with a single chain light loads can be lifted at 150 ft. a minute, thus effecting a considerable saving in time over the use of the ordinary gear. In cranes of recent construction the various shafts, pins, worm, &c., are made of steel. A reversing motion must, of course, be fitted, and should be of the simplest construction; also a powerful brake. All spindle bearings should be of gun-metal or phosphor-bronze, and the link motion and other working parts case-hardened. For slewing the cranes, instead of reversing the engines many users prefer the friction-cone system of reversing; in this case, instead of reversing the engine in the usual way, a set of double-friction cones are employed, and these are thrown in and out of gear in either direction as may be required. It is claimed for this arrangement that the last part of the motion being friction all breakage of the geared wheels is avoided.

The starting levers, brake, &c., should be arranged so that they are all readily under the control of the driver. Great care should be taken in keeping all the working parts thoroughly lubricated, especially the centre pin; a little powdered plumbago added to the grease for this will be found an advantage. Some makers arrange this pin to run in an oil chamber.

Portable Engines.

The manufacture of portable engines has been brought generally to a great degree of perfection, and if a buyer deals with a reputable firm, and pays a fair price, he will generally receive his money's worth. As, however, a considerable number of engines of inferior design and construction are still made, we will consider briefly some of the points of construction to be desired in an engine especially adapted to the requirements of builders and contractors. In the first place,

care should be taken to secure an engine fitted with a boiler of ample capacity, and with a heating surface for generating steam in excess of the absolute requirements of the engine. This warning is necessary, as nominal horse-power practically means nothing, and a maker can call the power of his engine what he likes, consequently we find some engines of the same nominal horse-power much smaller than others. The fire-box, too, should be of ample area, and for contractors' purposes about one-third larger than is usually fitted where steam coal is the fuel used. This will enable wood and other waste to be burnt as well as coal.

If a boiler or fire-box of limited capacity in proportion to the size of the cylinder is used, a full pressure of steam cannot be kept up without forcing the fire, which means a constant waste of fuel and a more rapid deterioration of fire-box and tubes. Economy of fuel is also secured by the use of a feed-water heater, which is now largely fitted to portable engines. The crank-shaft should be extended in both directions, so that power can be taken off on both sides of the engine. By this arrangement a mortar-mill may be driven from one side, a hoist from the other, and, if required, a a circular-saw bench from the fly-wheel. Where much power is taken off it is important that the saddle-bracket casting supporting the crank-shaft should have an extended base, with an ample bearing on the boiler. The crank-shaft bearings should also be made readily adjustable for wear horizontally, as the "pull" on the bearings is generally considerable. For contractors' use a simple form of reversing motion will be found very useful for winding purposes, &c. Iron travelling wheels and axles are much to be preferred to wood, and it will add considerably to their longevity if the wheel naves are chilled and the axles case-hardened. Where low first cost is not an object, or where fuel is dear, a compound portable engine can be recommended, as there is no doubt that this system effects a considerable economy over the ordinary single or double high-pressure cylinders.

Mortar and General Grinding Mills.

Perhaps the most generally useful machine in a builder's plant is the mortar-mill. By its aid large quantities of old bricks, rubbish, ballast, broken stone, &c., can be economically utilised which would otherwise be thrown away; in fact, few builders can afford to dispense with its services. It might be imagined that little could be said about so common a thing as a mortar-mill, but this is far from being the case, as we shall presently see. For convenience of discussion, mortar-mills may be divided into three classes: (1) Those driven from below; (2) those driven from above; (3) those with stationary pans.

Mills driven from below are most commonly used, and for general purposes are to be preferred. To secure satisfactory working and freedom from excessive vibration a mortar-mill should be of substantial construction, with the pan arranged to work as low, or, in other words, as near the ground as possible. In addition to lessening the vibration of working by this plan, the men are enabled to work on the level, and fill or clear the pan much more rapidly. This may be secured by making a recess in the foundation plate for the driving pinion and by digging a trench for the fast and loose pulleys to revolve in. With this arrangement, and by spreading the base of the end upright standards, the end supporting strut, often fitted, can be dispensed with. The foundation may be of iron or wood; the former, which should be of a box section, is to be preferred, as wood will very soon decay, and the bolts work loose, causing vibration, and the footstep-bearing to wear out of truth. This footstep-bearing usually gives more trouble to keep in order than all the rest of the mill. In mills of ordinary construction, the vertical spindle is usually arranged to run either in a gun-metal or hardened steel centre, but, owing to the very great pressure, this is not by any means easy to keep lubricated, and should the bearing once be allowed to sieze, it will give constant trouble, and rapidly grind away. In lieu of the ordinary centre or toe bearing, the author recommends an improved arrangement, which, although new, has been well tested.

The vertical spindle is considerably extended at the base, and the covered-in bearing or chamber is so arranged that a constant supply of oil can be introduced through a tube which passes up through the vertical spindle.

All bearings should be fitted with covers, or so designed that dirt and grit should be excluded as far as possible, as this is a fruitful cause of bearings running dry and grinding away. They should also be made adjustable for wear, and kept well lubricated, a mixture of grease or oil with a little powdered plumbago,—say, three of oil to one of plumbago,—will be found very serviceable, as the plumbago both retains the oil in the bearings and gives them a surface. Care should also be taken that the crown wheel and pinion are kept well greased, or they will soon grind away, and at the same time take considerably greater power to drive. To ensure the false bottoms wearing away evenly all over, either loose collars should be fitted to the roller axle, so as to allow of the rollers being moved horizontally, in order to alter their path, or the false bottoms themselves should be so arranged that only the part of them subject to the wear of the rollers need be renewed. When a considerable variety of coarse and fine materials are ground, a distinct advantage may be secured by fitting adjustable spiral springs at each end and below the roller axle. By means of these springs the pressure of the rollers can be adjusted to the work, at the same time the power required to drive, and the noise of working, are reduced. The scrapers,—which should be of wrought-iron,—are less liable to break if mounted in adjustable brackets instead of being fastened by screws, as is usually done. With the object of facilitating renewals some makers construct the crushing-rollers with separate rings or tyres, these latter being wedged on to the rollers and being readily removable as required. It need hardly be said that both rollers and false bottoms should be made of very hard metal. Where there is a constant change of work and it is necessary to move from place to place frequently, mills of small diameter,—say up to 6 ft.,—may be mounted on a travelling carriage with advantage. The carriage should by preference be of wrought-iron,—girders are very suitable,—and the wheels also should be of wrought-iron. With mills above say 8 ft. in diameter friction rollers to support the pan can be fitted with advantage. In this case to secure smooth running the friction roller path should be turned.

Engines and Mortar Mills combined.

These are used to a limited extent and for light work and cramped situations may be useful, but after considerable experience I prefer wherever possible to use a separate mill driven by a belt in the ordinary manner. In many cases the engines supplied with these mills are of insufficient power, and if rough heavy work is required are apt to fail when wanted. Where larger engines are fitted the weight becomes excessive for readily moving from place to place. In all cases the travelling wheels should be of wrought-iron; if of cast-iron they are apt to fail, especially in frosty weather. Very low wheels are to be avoided as they add largely to the draught; they are, however, somewhat more convenient in fixing the mill for work, and avoid the necessity of letting the wheels some distance into the ground, as may be neces sary with high wheels. Some manufacturers of this type of mill make the mortar-pan stationary and cause the rollers to revolve. In this case care must be taken that the central shaft is not allowed to work slack in the crown wheel, or the latter will sink too deeply into gear with the driving pinion pinching it, and taking a large amount of power to drive, or breaking it altogether. Another fruitful source of driving-pinions breaking arises from the work being too heavy for the mill, the pan being crowded, or the crushing-rollers being unduly heavy. I have known a case where a number of pinions were broken through excessively thick rings being fitted to the rollers, the teeth of the pinion at the same time being unduly weak. Many mills of the combined type are fitted with crown wheels of much too small diameter, and consequently run too fast. From my own experience, especially for heavy work, I can recommend that crown wheels be made of as large a size as the diameter of the pan will readily admit. A shoot for the self-delivery of the mortar is occasionally fitted, but this arrangement has not come into general favour. The engine should not, in any case, be fitted to the same frame as the mill, as is sometimes done, as the vibration of the rollers working will cause it rapidly to deteriorate. I prefer a driven pan to a stationary one with driven rollers, and the output of mortar is larger.

Hoists.

In ordinary house and building contracts a very considerable amount of time and labour may be saved by the employment of a hoist for raising the bricks and mortar and other materials to the top of the building. The simplest form of hoist is one actuated by friction gear, and driven by a belt from a portable engine. One sufficient to lift about 5 cwt. is generally most suitable, as it is sufficiently strong to lift rapidly a wheel barrow load of such materials as may be required. It should be firmly fixed on the ground or in such situation that there is little vibration in working, or the bearings will much more rapidly deteriorate. By the use of snatch-blocks or ground wheels and frames in conjunction with a top wheel, the barrows may be delivered in almost any part of the building. A steel wire rope or iron chain is usually employed for hoisting; the former is, perhaps, to be preferred. By means of a rope and a lever attached to the machine the load may be instantly raised, lowered, or stopped, as may be required by those on the top of the scaffold. As the friction on the spindle bearings of the hoist is considerable, they should by preference be made of gun-metal or phosphor-bronze and be readily renewable. If carefully looked after a bearing of cast-iron will last a long time, but if once allowed to seize it will rapidly cut away; in fact, we have known one rendered unworkable in a week. The main frame of the hoist should be strongly made and well braced together. A belt as wide as may be convenient should be employed for driving and be run at about 20 ft. centres. This form of hoist is usually speeded to run at from 150 to 250 revolutions per minute.

Wood-working Machinery.

The selection of wood-working machinery must depend very largely on the size and nature of the business carried on. It need hardly be said that, to have one or two machines fully occupied is better than to have a number only occasionally used. In an ordinary building business of moderate extent, a great deal may be done with a rising and falling spindle saw-bench and a combined vertical and overhanging spindle moulding and shaping machine, or a good general joiner. With a rising spindle or rising table saw-bench, in addition to ordinary ripping and cross-cutting, a variety of work, such as rebating, tonguing, grooving, &c., and, by making the spindle long enough, the saws may be used for tenoning. The fence should be made to bevel for feather-edging, &c., and be arranged to turn over out of the way, so as to leave the top of the bench clear for cross-cutting. An adjustable mitreing and cross-cutting plate may be fitted to slide in the top of the bench with advantage. By using a bench in which the saw-spindle is a fixture, and the table is arranged to rise and fall, a countershaft can be dispensed with.

With a combined vertical and overhanging spindle moulding and shaping machine a great variety of work may be done, including straight or circular mouldings, twisted hand-rails, sticking straight or circular sash-bars, moulding, rebating or grooving straight or circular sash-frames, moulding raised door-panels, moulding, chamfering, or recessing

ornamental stall-ends, trenching, housing string boards for stairs, &c.

To secure steadiness in working, the main frame of this machine should by preference be a hollow-cored casting made in one piece. The cutter-spindles should be of steel, and be arranged to reverse so that the cutters can always be made to cut with the grain of the wood. By combining the vertical and overhanging spindles both exterior and interior work may be executed as required. The table carrying the wood is best arranged to be brought up to the overhanging spindle by means of a treadle and lever, and a spring stop may be used to check its ascent at any desired point.

A considerable variety of combination machines or general joiners are now made. Some of these are good, and some very bad. Amongst the latter may be classed those machines in which band-saws, tenoning, planing, &c., machines are huddled up together on one bed-plate. This arrangement simply means short driving centres and other evils without any corresponding advantages. The best general joiners are those in which too many operations are not attempted, and if a machine is arranged for, say, sawing, planing, moulding, and tenoning, and will perform these operations thoroughly well, it is economically superior to more complicated, and therefore less efficient, machines. In the best machines the operations of sawing, and planing and moulding are performed by separate spindles, so arranged that they may be worked separately or simultaneously as may be required. The saw-table is arranged to rise and fall for grooving, &c. The planing and moulding machine is arranged to work on all four sides at once, the wood being fed through by geared feed-rollers. Tenons are better and more readily formed by revolving cutters than by saws, and shoulders of unequal length may be cut if required by moving one of the blocks on its spindle. It need hardly be said that in building businesses of magnitude a great variety of wood-working machines may be employed with advantage, but we cannot do more here than give them a passing reference.

Leather Belts, &c.

Be sure that the driving pulley and the driven are perfectly parallel to one another, or the belt will not lead straight, and will stretch unevenly, consequently a considerable amount of driving-power will be lost. Be sure the belt is kept pliable, and is neatly joined. A good dressing for leather belts is either dubbin or boiled linseed oil, or a mixture of mutton fat and beeswax in equal parts can also be recommended. Do not use resin or other advertised remedies for increasing the driving power of belts; the effect is only temporary, and many of the mixtures sold are absolutely deleterious to the belt. If it is necessary to increase the driving power, either use a wider belt, or, if the pulley is not wide enough, a second belt may be run over the top of the first.

Drive with belts of ample width; if a belt is strained it will much more rapidly deteriorate. It may be safely assumed that every inch in width of a good single leather belt will, under ordinary circumstances, transmit 1 horse-power when running at a speed of 800 ft. per minute. Never under any circumstances run belts at short centres, or much power will be lost through slip, and the belt and bearings will soon wear out. Avoid crossed or vertical belts. Use thin, wide belts when driving small pulleys, and keep them clean and smooth.

An important factor in securing steady working is the proper joining of the belt. For heavy driving, such as that of large mortar-mills or saw-benches, nothing is superior to a thoroughly well-made laced butt or lap joint. The lace holes should be of oval shape, and should be punched zigzag, or, in other words, should not run in a straight line across the belt, or it will be considerably weakened thereby. The holes should, however, be made at regular distances so that they may be used again when the belt is taken up. In the case of lap joints the ends of the belt should be thinned down to suit the curve of the smallest pulley over which they have to run. The foregoing remarks refer to leather belts. A large number of cotton belts are now made; these require more or less different treatment, according to their manufacture, but an application occasionally of a dressing of linseed oil varnish should keep them fairly pliable.

In conclusion, if you want the fuel bill to be low and the plant to wear a long time, be sure to secure men who thoroughly understand their business; so-called "cheap" engine-drivers, &c., are generally dear at any price.

NOTES.

THE second reading of the "Architects' Registration Bill" was not reached in the House of Commons on the day for which it was put down (the 11th), and we presume it may now be considered to be adjourned *sine die*. The persons concerned about it seem, however, to have been determined to keep up to the last their character for prevarication and misrepresentation through the medium of the press. On Wednesday a letter appeared in the *Times* from Mr. Gough in which, among other things, it was stated that this Bill was promoted "by the Architects, Engineers, and Surveyors of the United Kingdom," a statement which, in the face of the fact that all the best men of those professions and all their representative bodies are united against it, can only be characterised as practically a falsehood; and in a letter to the *Morning Post* on the same day, Mr. Gough informs the readers of that journal that the examining bodies under the Bill will be the Institute of Architects, the Institution of Civil Engineers, and the Surveyors' Institution. The fact that those three bodies have all refused to have anything to do with him or his Bill is, of course, a minor matter of detail, which it is unnecesary to explain to the readers of the *Morning Post*. There is nothing more mean and contemptible than this kind of *suggestio falsi*, which says what is verbally true in one sense, in the hope that it will be understood in another sense; and the tactics employed in pushing this Bill are not only discreditable to those who employ them, but reflect a kind of discredit on the profession generally. An engineer remarked to us the other day that it was because the architects were such a divided profession that this sort of trouble became possible; and it is an unpleasant reflection that there is probably no other liberal profession in which a clique of obscure persons would try to push themselves in front of their superiors in the profession by such tactics as these, or would get even the degree of support within the profession which these people have received.

IN regard to this question of unity, it is gratifying to see that two eminent architects who are not members of the Institute (we wish they were) have come forward in the *Times* to support the action of the Institute of Architects, Mr. Jackson and Mr. Butterfield. Mr. Jackson's letter is a very forcible and able expression of his view of the subject, to which he has already given utterance in the paper which he read at the Architectural Association, and which we reported in full at the time (see *Builder* for Dec. 24 last, p. 873). We do not, in saying this, necessarily adopt the view expressed, a question which we reserve for more deliberate consideration. Mr. Butterfield's letter takes another line, that in the talk about architects being deficient in sanitary science, it is forgotten how much at sea sanitary science is at present; and he instances the treatment of London sewage as an example. It is only too flagrant an example, but do the various stages in this enterprise really represent the best sanitary opinion of the day? Have they not rather been carried out in opposition to it? We do not think sanitary science, as far as regards the sanitation of dwelling-houses, is at this moment in so uncertain a state as Mr. Butterfield would indicate. Disposal of sewage is a larger question. As to "the ill effect which registration would have upon architecture as an art," Mr. Butterfield declines to say anything, but leaves us to infer that he thinks a great deal.

THE holders of debenture stock in our great railways have not of late years been able to enjoy that feeling of absolute safety which the possession of such undeniable security was always supposed to insure. They were all called upon in the spring of 1886, in common with ordinary stock-holders, to protest against Mr. Mundella's Railway Bill, and asserted that their property was in very serious jeopardy. So far as projected legislation is concerned, it might be supposed that the anticipated evil is still threatening them, as many of Lord Stanley's proposals differ very little from his predecessor's, though the directors do not regard them with the same alarm. But a new uneasiness has now arisen, owing to the recent conversion of the Consols. It is suggested by a contemporary that, money being so cheap as to enable the Government to effect this change, it becomes the duty of railway companies to endeavour to pay a lower rate of interest for their borrowed money. In the light of these disquieting suggestions the following remarks appear quite prophetic:—"The aim of the Government, so far as I can judge, would seem to be this, to shake the confidence of the holders of ordinary stock and induce them to take debenture stock. Then debenture stock must fly up more and more, and then we can come in with our quack scheme for reducing the price of the funds to 2½ per cent. But let no debenture-holder think that he is safe." These remarks were made by Mr. Richard Dart, at the special meeting of the London and North-Western Railway, held at Euston, on March 31st, 1886, before the present Government came into office. A reference to the Parliamentary return issued last year shows that the capital of the twelve principal lines in this country is distributed as follows:—In round figures the total capital is 556,000,000*l*., and there are 152,073 holders of ordinary stock, 165,147 of guaranteed and preferred stock, and 76,887 debenture holders. This gives a good idea of the magnitude of the "vested interests" thus menaced.

THE plans for what is now called the "extension" of the Admiralty Offices, which have been on view in the tea-room at the House of Commons for the last few days, present a melancholy spectacle of the anti-climax of what was at first supposed to be a great architectural scheme for a national building. The new buildings consist mainly of a large L-shaped block added between the present Admiralty buildings and St. James's Park, commencing at the north-west corner of the block of old buildings, and continued westwards towards the Mall, and then the other arm of the L continued southwards, parallel with the old building, leaving a space called "Admiralty Gardens" between the old block and the new west block, and bounded on the south by an open colonnaded screen between the old and new blocks. The Mall roadway is shown continued through to Charing-cross, and a short new road is also shown adjoining the north block and at right angles to Whitehall, leaving a triangular island of houses between it and the Mall continuation. The main feature of the new buildings, in the shape of a low dome, is towards this road, in the centre of the north block. The architectural treatment of the design may be said to be the skeleton of Messrs. Leeming's original design, with almost every decorative feature rigorously shorn off, and the whole reduced to a utilitarian simplicity. In some respects this is not altogether a loss, as much of the original detail was tawdry and in poor taste; it seems a pity, indeed, that the practically objectionable feature of the great projecting surbases and useless columns was not cut off or reduced at the same time. The appearance of these on the plan, on the west front of the buildings, with the not very large windows buried between these projecting masses, looks anything but promising for the lighting of these departments. In a general way, however, the aspect of the new buildings towards the Park, as shown

in these drawings, with a high stone basement story and red brick walls with stone dressings above, is not out of keeping with its surroundings, and may be called unobtrusive and unobjectionable,—more so, perhaps, than the original design. This, however, is a poor thing indeed to say in regard to what was to have been the most important national building since the Law Courts, and might have been a superior building to the latter. The screen on the south side, before referred to, which might have been taken advantage of for something really graceful and original, seems commonplace itself. The general frontage to Whitehall is, of course, nearly as existing; it is shown, with the new buildings grouped behind it, in a prettily-executed water-colour drawing. There is no particular objection to make to the scheme beyond the negative one that it is merely utilitarian and economical, and has no architectural interest or value of any kind. A great opportunity has been thrown away by mismanagement and a craze for economy, the great party watchword of the day.

PERHAPS the most interesting discovery,—from the point of view alike of art and archæology, that has been recently made on the Acropolis, is that of a painted plaque of great beauty. The design represents a youthful warrior in high-crested helmet, bearing a shield on his left arm and advancing to hurl a spear from his right. On the right side of the head an inscription in dark red letters reads distinctly καλος (beautiful), on the other side in the same dark red letters the name of the warrior has been written, but only two letters remain. This name has been in part effaced to make way for an inscription in roughly-painted letters of a light red, consisting apparently of a now half-effaced name. This seems a clear illustration of the custom so popular among vase-painters of inscribing a design with the name of a favourite beauty. The present case is an instance further of the practice, no doubt equally popular among the mischievous, of effacing one name to make way for another. The great interest of the plaque, however, centres in its technique. Four colours only are used, just the number attributed to Polygnotos. They are white, light red, dark red, and dull brown. The drawing of the face is of remarkable beauty, the profile is somewhat of the Euphronios type, but the eye is turned full sideways. The letters of the inscription date the plaque as of the time of Polygnotos, and we cannot be wrong in taking this as the nearest approach we as yet possess to a specimen of his style. It is much to be hoped that a coloured facsimile will be published before the beautiful and delicate colouring fades.

THE work of piecing together the discovered fragments goes on in the Acropolis scarcely less fast than the actual work of discovery. Indeed, some will be inclined to think it goes on somewhat too fast. The restoration proposed by Dr. Studnizcka of the statue he supposes to be by Antenor is accepted. We confess ourselves unable, after a careful examination of the fragments in question, to see anything like sufficient evidence. Dr. Winter has proposed, and with much more probability, that one of the most delicate of the archaic figures discovered should take its place on the pedestal inscribed with the name of Euthydikos, as dedicator. The archaic head of Athene, supposed to come from the pediment of the old Athena temple, has been firmly fixed on a body to which we have no hesitation in saying we do not believe it to belong, and it presents in its present position a very strained and uncomfortable appearance. It is pleasant to point out one new juxtaposition, for which we believe there is ample warrant. A large square pedestal has been found supporting a base, on which still remains a beautiful foot of archaic style. The base is inscribed in archaic character from right to left,—(κ)ονβος ἀνεθηκεν ὸ Π(α)λον. Konbos, son of Palus, dedicated. To Dr. Winter the credit is due of having at once perceived that the foot was of the same marble and same technique as the long-famous Calf-bearer (Moschophoros). One can only regret that the name of the sculptor is not added.

WE hear that the owner is minded to pull down Keats's second home at Hampstead. After a short stay in lodgings in Well-walk, Keats went to live with the family of Mr. Charles Armitage Brown, a retired Russian merchant, and the original of his humorous verses entitled "A Portrait," which were first printed in W. M. Rossetti's edition of the poet's works. The Browns resided at what was then Wentworth-place, in John-street, at the foot of Downshire-hill. The house, formerly Lawn Cottage, is now known as Lawn Bank. Standing well back from the road, it may be recognised by its red paint (in two shades), and white chimneys; and the white wing added on to its right side. Keats was a frequent visitor of Leigh Hunt at a house since rebuilt as South Villa, in the Vale of Health, Hampstead. William Howitt, in his "Northern Heights of London," says that previously to removing to Mr. Brown's (Lawn Bank), Keats and his younger brother Thomas,—who died in 1818,—had occupied apartments at the house adjoining. This was the home of Mrs. Brawne and her daughter Fanny, relatives of Mr. Brown. Lawn Bank, and the detached villa, Wentworth House, formed the two blocks, Wentworth-place, whereof Mr. H. Buxton Forman speaks in the appendix to his volume of the "Letters of John Keats to Fanny Brawne" (1878). Keats spent most of the interval, 1817-20, at Hampstead. It was broken, however, by his tours in Scotland and along the south coast. During the autumn of 1819 he was lodging in Westminster, in Great Smith and Great College streets, whence he addresses some of his letters to Fanny Brawne. In September, 1820, Keats, accompanied by Severn, left England for Naples. An iron seat has replaced, within the past three years, the wooden bench at the end of Well-walk, whereon he was wont to rest. It is mentioned by Hone, Leigh Hunt, and Howitt; and thereat Coleridge saw Keats for the last time, whispering to Hunt that death was in the hand he had just taken. Well-walk, too,—with its Zion Chapel for irregular marriages, its Gardens, its Pump and Assembly Rooms, famed for their "raffling shops" and "consorts of musick," is altered by the Wells Charity Trustees out of all remembrance of what it had been in Keats's time. The charity was founded in 1698 by the Honourable Susanna Noel, mother to Baptist, Earl of Gainsborough, who devised six acres of waste heath, "encompassing the well of medicinal waters" for benefit of the Hampstead poor. An inscription on the new drinking-fountain commemorates this endowment.

IN reference to the Charity Commissioners' scheme,—as just passed by the Council on Education, — which introduces considerable changes into the constitution of the Stationers' Company School, it may be mentioned that the present school, for sons of members of the Company, and others, was established in the Company's premises at No. 6, Bolt-court, Fleet-street, nearly thirty years ago. The master's house is commonly said to be that which formed the last London home of Dr. Johnson. But this is a mistake. The house, being No. 8, Bolt-court, into which Johnson removed from Johnson-court hard by, in March, 1776, passed after his death into occupation by Bensley, the printer, successor in business to Johnson's friend, Allen. Damaged by a fire which broke out there in 1807, it was entirely consumed by another fire June 26, 1819. The premises were rebuilt by Mr. Bensley's son; and in 1858 the property, consisting of four houses and a large garden was sold by the Bensleys to the Stationers' Company. This is the garden,—now, we take it, the boys' playground, — wherein Boswell records that he sat with Johnson, after morning service at St. Clement Danes, on Good Friday, 1783, discoursing of manufactures, orchards, and hospitality in country houses. A passage once existed from the playground, north-western corner, into Gough-square, by Gough House, formerly Lord Calthorpe's, and opening out close to Dr. Johnson's house in that square.

MR. ADOLPHE GUILLON, the painter, who resides at Vézelay during the summer months, calls attention to the ancient gateway called La Porte Neuve at Vézelay, one of the most interesting specimens of sixteenth-century military architecture in France, which is in danger of falling into ruin for want of repair. The stonework of a portion of the vaulting of one of the towers is much decayed and a part of the vaulting has given way. If the rest of the vaulting follows suit it will involve the destruction of the guard-room above the gate, a part of which rests upon the tower referred to. At the present time it would be possible to put the tower, which is in a dilapidated condition, into a proper state of repair at a moderate cost, but if this repair is postponed the cost will be greatly increased. The gateway, which is remarkable for its sculptured decoration, is very badly looked after; in fact, is not looked after at all; it is covered with vegetation, which is destroying the masonry and almost entirely covers the ornament, which is now scarcely discernible. This is an example, says Mr. Guillon, how old buildings are allowed to fall into decay and are then practically rebuilt. Vézelay has already lost one of its ancient gates for want of care, and it is to be hoped that the same fate will not overtake the Porte Neuve.

THE exhibition of the new English Art Club, at the Dudley Gallery, as we caught a glimpse of the pictures in the crowd of the private view day, left us with what we should have painted, if that were possible, as an "impression" of disgust. This was in some measure due to the view of some of the most conspicuous pictures seen over the heads of the crowd, notably, Mr. Sickert's painting of a music-hall scene (5), which seems to us in treatment and subject to represent about the lowest degradation of which the art of painting is capable. Mr. Steer's large "Summer's Evening," too, was purely repellant under the circumstances. Fortunately, a quieter examination enables us to revise this first impression. The latter-named painting, a scene with bathers on a beach lighted by a strong setting sun behind the spectator, when seen from the other end of the room develops into a rather remarkable though forced study of an effect of strong warm light; but was it worth while to cover such a large canvas for a mere study of effect? For the figures have no beauty and are utterly unfinished. Among other things in the room to be noted is a very clever "Portrait" (43) of a young lady seated, in profile, by Mr. E. A. Walton. Mr. Llewellyn's "Reverie" (28) and "Eventide" (90) are faintly delineated landscapes and figures filled with much tender poetic feeling. Mr. Stanhope Forbes's "Palmistry" (36) is a clever study of a man in evening dress studying the art agreeably on the hands of a very beautiful girl. "Chrysanthemums" (10), by Mr. Herbert Dalziel, is a fine thing, a large study of flowers which typically illustrates the best side of the tendencies of the club (which is, of course, an off-shoot of the French "impressionist" school), the endeavour to realise an effect, and to escape from mere painted detail. There are other works in the room which show that this view of painting has a certain value of its own, though, after all, it is merely what we are all familiar with under the term "sketches," only that many of them are sketches on a large scale instead of on a small one, and we have to stand a long way off to reduce them to the proper scale and keeping of a sketch. This is a sinful waste of canvas and of manual labour. There are things in the exhibition of which worse might be said, and which are a fraud and an impertinence, but the exhibition is not one to be passed over.

THE exhibition at Messrs. Dowdeswell's of Mr. Mortimer Menpes' Japan sketches, which will open to the public on Monday, is well calculated to take the popular taste for novel effects in picture galleries. The room is

hung with a peculiar pinky-toned silk; the small drawings are in very large gold mounts, and hung on the walls with a studied irregularity of line; the whole effect is picturesque and decorative, but affectedly eccentric. Many of the little water-colours, especially of Japanese figures, are very good, charming in colour and full of character. We may mention Nos. 2, 5, 14, 17, 103, 104, 113, 114 (almost the only bit of landscape, an effect of very dark blue water with a wooden bridge), 116, 117, &c. Mr. Menpes' etchings we can find no admiration for; they are mere scratchings. But the small exhibition is so novel in character that it will probably have considerable popularity.

WE have received from Messrs. Catty & Dobson a small collection of etchings by Mr. C. R. Barrett, of Ockwells Manor House, some sketches of which we published recently. The etchings are picturesque and well handled in regard to pictorial treatment, rather than architecturally effective; but they form a pleasant collection of illustrations of an old English house of considerable interest.

AN illustrated catalogue of "Domestic Electric Supplies" sent to us by Messrs. Woodhouse & Rawson, and copiously illustrated, forms a useful memorandum in connexion with the subject of electric appliances in the household. It may surprise some readers to find that "electric jewellery," *i.e.*, personal ornaments emitting electric light, is now a recognised branch of domestic electric supply. Here is the means, no doubt, for necklaces and tiaras made of something that flashes brighter and more vividly than diamonds; but with the drawback that we know a concealed battery has to be carried somewhere about the fair wearer to keep up this show, which may under some accident, too, go out; while the lustre of the diamonds is inherent. We hardly think electric jewellery is ever likely to be regarded as "good form"; it may do well enough for effect on the stage. Electricity, which is to take (probably) the place of gas, is at present used also to light gas, and the electric lighter is certainly cleaner and more handy than matches, tapers, or "spills." The more serious and business-like uses of electricity in the house are also well illustrated in the catalogue. In the matter of bells, we observe that Messrs. Woodhouse & Rawson offer us the "Jensen electric bell," which "instead of emitting the unpleasant jarring noise of the ordinary electric bell," has a musical tone, is (or can be) made in the ordinary bell shape, and can be rung so as to strike a single stroke, or any number of repeated strokes, which can to a certain extent be formed into a system of signalling for the servants. This seems to promise some escape from the nuisance of the ordinary electric-bell system, which, after a year or two of trial, does not entirely recommend itself, even as a substitute for the old bell-hanging system. The constant monotonous sound of the one bell is most wearisome; it is exasperating to the ear when heard close to, and yet (if fixed in the basement) often nearly inaudible at the top of the house; and if a servant happens to be at the top of the house when the bell rings, she has to run downstairs to the indicator board to see which bell has rung before she can answer it; whereas with the old bell system servants soon learned to recognise the various bells by their respective pitch and tone. The one-bell system of electric bells should be abandoned, or, at least, modified for the comfort of a household.

The Proposed Cathedral for Liverpool. At a meeting of the Cathedral Executive Committee, held on Tuesday, it was resolved,—"That the Executive Committee, having considered St. Peter's Church site, are of opinion that it is suitable for the erection thereon of a cathedral, and commands very general approval, but their endeavours to obtain pecuniary help have not met with the success they hoped for, and they, therefore, leave it to the general committee to decide what further steps should be taken."

THE EXPLORATIONS AT CYPRUS.

WE have more than once pleaded the cause of the Cyprus Exploration Fund, and we are glad to be able now to lay before our readers the latest news of the work now in progress at Paphos. Wednesday evening (March 28) was an interesting occasion for the British School of Archæology at Athens. Mr. Ernest Gardner, the Director of the School, had just returned from Cyprus, and he lost no time in laying before the members of the school and other invited guests the results of his labours. His address was deeply interesting, both as regards the actual facts of the discoveries and the deductions he drew from them, which deductions, as the excavations are still incomplete, he repeatedly desired might be regarded as purely provisional. Before stating the actual results Mr. Gardner briefly noted the theories held by other explorers as to the site and plan of the Paphos temple. Perrot and Chipiez's plan was purely hypothetical. Cesnola's, Mr. Gardner clearly showed, was based on a misunderstanding of the few remains above ground. On this basis, however, had been erected a superstructure which, while it claimed to be matter of fact, was, as serious excavation had proved, largely built up of pure fancy. It was obvious, therefore, that there was ample room for a thorough examination of the site. The excavations were not begun till early in February, as complications had arisen as to the necessary permission to dig. So far, results of great promise had been obtained in three departments of antiquities, inscriptions, sculpture, and last, but certainly first in importance, the ground plan of the temple had been made out with something like certainty. About half the supposed site of the temple had been dug out when Mr. Gardner left. The ground-plan has turned out, as might be expected, to be not Greek at all, but Phœnician. General Cesnola had restored it as an oblong cella surrounded by a peribolos. It turns out to be composed of a central chamber and two side ones, with adjacent colonnades. Without illustrations it is, of course, impossible to make the scheme clear; Mr. Gardner showed drawings both of the remains still extant above ground of Cesnola's conjectural plan and of the foundations excavated. To this statement of facts arrived at he added a very interesting conjecture. Some of the coins of Cyprus show a type representing a main shrine, with two adjacent chambers; in the main shrine stands the cone-shaped ancient image of the Paphian goddess, and there are indications of the adjacent colonnade. Mr. Gardner thinks that the coin reproduces in its main outlines the temple just unearthed. He also called attention to the anomalous plan of the ancient Capitoline temple, which, as it was attributed to the Tarquins, probably owed much to the influence of Etruria, and, therefore, of Phœnicia. When it is remembered how little is certainly known of the form of Phœnician temples, it will easily be seen that the discovery is of the first importance; and, as Mr. Gardner justly urged, it was a work well worthy of the British School at Athens to elucidate the worship of a goddess so constantly present to the mind of the ancient Athenians. A good deal of surprise has been expressed at Athens that the "school," as yet in its infancy, should have been for so many months bereft of its Director, but since he has returned so richly laden his absence can, in the interest of archæology, be only matter of congratulation. He returns to Cyprus in about a week's time. The foregoing must be taken merely as an indication of the direction the work is taking. For anything like an adequate report we must await the publication of results in the *Hellenic Journal*.

Royal Academy: Architectural School.—We are asked to mention that the class for modelling has ceased for the session, and a series of demonstrations on "Sub-Panelling and Ceiling Design" will be given by Mr. Stannus on the Monday evenings, from 6 to 8, as follows:—April 23, Theory and Treatment of Squares; April 30, Treatment of Oblongs; May 7, Various regular Panels; May 14, Various irregular Panels; May 28, Distortion, and Translation; June 4, Diapers of Panels; June 11, Visual correction, Beam treatment, &c.; June 18, Structural inequalities, Mixed treatments, &c.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

ILLUMINATION AND VENTILATION.

THE ninth ordinary meeting of this Institute for the present session was held on Monday evening last, Mr. Thomas Worthington (Vice-President) in the chair.

Mr. W. H. White (Secretary) announced that a large number of donations of books, "Transactions," and pamphlets had been presented to the Institute, a list of which would appear in the next issue of the Proceedings. A vote of thanks was, on the motion of the Chairman, accorded to the various donors.

The Chairman said that a communication had been received from Mr. Lawrence Harvey, who was willing to hold, from next October to June, 1889, a complete course of lectures on masonry, including the whole syllabus of the Paris École des Beaux Arts. The course would consist of sixty lessons, and the minimum number of pupils necessary to cover the expenses would be sixteen.

Mr. J. Macvicar Anderson (Hon. Sec.) added that the Council wished it to be known that the course of masonry proposed by Mr. Harvey deserved to be encouraged. It would be a pity if such a class, which had done much good in the past, should be permitted to fall through for want of support. All that Mr. Harvey asked was that at least sixteen pupils should come forward as some sort of guarantee to compensate him for the expense attending his lectures.

Mr. Charles Barry said it ought to be mentioned that the fee for the sixty lessons was only five guineas, which was very small considering the great value of the lectures.

Mr. A. W. Blomfield, A.R.A., remarked that he had induced some of his pupils to attend Mr. Harvey's lectures, from which they had derived great benefit. The fee of five guineas for sixty lessons was, he thought, extremely moderate.

Mr. Arthur Cates said that the preparation for the sixty lectures, in the way of diagrams and models, was a very serious undertaking on the part of Mr. Harvey. It was, therefore, of great importance that he should be assured of the support, which was essential, at as early a period as possible.

Professor Kerr said he was afraid that the fee of five guineas would be, to a great extent, prohibitive. He would, therefore, ask if it was possible for the Council to subsidise such lectures. If Mr. Harvey treated the subject, as no doubt he did, as the philosophy of masonry construction, that was a matter which lay at the very root of artistic as well as structural design. It would, therefore, be a good opportunity to subsidise these lectures, as the Institute had plenty of money. (Cries of "No, no," and laughter.)

A ballot was then taken, when the following new members were elected:—

As Fellows:—Mr. Robert Hutchinson, of Huntingdon; Mr. Henry B. Bare, of Liverpool; Mr. William Wimble, of Queen Victoria-street; Mr. Arthur Baker, of Warwick-gardens, Kensington; Mr. Alfred Williams, of Onslow-gardens; Mr. Robert Evans, of Nottingham; Mr. William Jolley, of Nottingham; and and Mr. Frank T. Baggallay (Associate), of Guilford-street, W.C.

As Associates:—Mr. Reginald M. Gruggen, of Clifton, Bristol; Mr. John W. Donald, of South Shields; Mr. John Peter, of Bohemia, Hastings; Mr. George W. Durrell, of Sydney, N.S.W.; Mr. Arthur T. Bolton, of Westbourne Park, Bayswater; Mr. Herbert A. Satchell, of Putney; Mr. George Hornblower, of Highgate, N.; Mr. William C. Jones, of Bedford-row; Mr. Edward J. Bridges, of Cosham, Hants; Mr. Walter H. Woodroffe, of Great Dover-street, S.E.; Mr. Sidney G. Goss, of Paignton; Mr. Thomas Davison (Ashpitel Prizeman), of Kennington, S.E.; Mr. Leonard V. Hunt, of Elthamroad, Lee, Kent; Mr. Thomas Henry, of Ealing; Mr. George A. H. Dickson, of St. George's-square; Mr. Arthur Sykes, of Brunswick-square; Mr. Arthur B. Pite, of Bloomsbury-square; and Mr. Edward H. Dawson, of Aldcliffe Hall, Lancaster.

Mr. Lacy W. Ridge, whilst the voting was proceeding, said it did not seem altogether right to submit, to the arbitration of the ballot, the election of members who had passed the Examination, and had thus acquired their qualification for the Associateship. The Institute was not a limited or a friendly society to which they were entitled to elect exactly those

who might please them; but it was a professional society which aimed at embracing within it all that was reputable and efficient in the profession. It should not, therefore, be in the power of a small number of persons to exclude a candidate without any reason being assigned for it. He had a very strong feeling that the time had arrived for dispensing with the ballot in connexion with the elections, of Associates especially, and he wished to hear if there was any corresponding feeling amongst the members (hear, hear).

Mr. Charles Barry agreed with Mr. Ridge so far as the Associates were concerned. The man who had passed the compulsory Examination had to that extent acquired a claim towards the Associateship, but before that claim was admitted each case was very properly considered by the Council, because it might be perfectly conceivable that a young man who had passed might, at the same time, be an undesirable member of the Institute (hear, hear). That discrimination was carefully exercised by the Council, and to that extent he agreed with the last speaker. It was different in the case of Fellows, who were not at present selected by examination, and who must, therefore, be elected under the old system of ballot. Every consideration should be given to the professional position and character of candidates for the Fellowship, and that could only be done by the vote of a general meeting.

The Chairman here interposed with the remark that, as no notice had been given of the matter, it would be well to defer its consideration to some future occasion.

Mr. Ridge said he had given notice that he intended to raise the question at some time or other, and he was rather surprised it had not been put down for consideration.

Professor Vivian B. Lewes, F.I.C., F.C.S., of the Royal Naval College, then gave a lecture on "Illumination and Ventilation," illustrated by numerous experiments. He said that if we leave out of consideration the various forms of electric light, we find that all our existing illuminants resemble each other in composition; the light-giving waxes, fats, oils, and gases all depending for their lighting and heating effects upon the elements carbon and hydrogen, which, by a selective process of combustion, emit light, at the same time producing as products of their complete combustion carbonic acid gas and water vapour, both of which have, when present in quantity in the air we breathe, a very deleterious effect upon our health.

The unit of illuminating power as adopted in England is a "sperm" candle of the size known as "sixes," which, when burning under normal conditions, consumes 120 grains of sperm per hour, and emits an amount of light known as "one-candle power." Adopting this standard and experimentally determining the amount of material used, in the best form of lamp or burner for its consumption, we have a means by which we can compare the lighting power and the vitiating effect which our illuminants give.

The amount of light to be obtained from a given volume of coal-gas depends upon the form of burner used, and in the following table the best of each class of burner has been selected for comparison, whilst the vitiating effect upon the air is also expressed in the number of adults who would exhale the same amount of carbonic acid gas during respiration. The gas used for the tests was that supplied to the City, which, during the past six months, has had an average illuminating power known as 16·5 candles. All volumes of gases are calculated at normal temperature and pressure.

From these data it appears that according to the rules laid down in sanitary science, by which the degree of vitiation of the air in any confined space is measured by the amount of oxygen removed and carbonic acid formed, candles are the worst offenders against health and comfort, and gas the least,—an assumption which practical experience does not bear out, the feeling of oppression being distinctly less in a room lighted by candles or oil than in one lighted by any of the older forms of gas-burner. The explanation of this is that when we use candles or lamps we are contented with a smaller and more local illumination than when gas is used, also more water vapour is given off during the combustion of gas, and this absorbs radiant heat and heats the atmosphere, whilst the air being charged with moisture, evaporation from the skin is checked.

Still more important reasons are, that, even in the highly-purified London gas small quantities of impurities are present which give products of combustion more deleterious to health than carbonic acid, whilst bad forms of burners cause incomplete combustion, giving rise to carbonic oxide, which even in small traces is highly poisonous; and finally all the products of combustion being at a higher temperature than the air of the room, rise to the ceiling and collect there, and the exhalations from respiration and the skin being at a lower temperature, cannot rise through them, so that the ceiling is practically lowered to the level of the gas-burners.

All these considerations bring us to the conviction that for the health of ourselves and our families we must have adequate ventilation specially provided to remove the products of combustion given off by illuminants from our dwelling-rooms.

If we use candles or oil-lamps, all we can do is to secure the ventilation of the room by the ordinary methods, as the conditions under which these sources of light are employed prevent their being used as a ventilating power; but with gas this is not the case. Attempts have been made from time to time to provide special ventilation and the removal of the products of combustion, but with the exception of "sun-burners" for large halls and places of public entertainment, none have met with any degree of success, owing to the unsightly tubes needed to convey away the heated gases; but with the new era of regenerative gas-lamps this trouble disappears, and gas can now be made not only the best and most convenient means of illumination, but also a most powerful engine for ventilation.

Of the various forms of regenerative lamps now in the market, the "Wenham" is the one most suitable for this purpose, as the shortness of chimney required and compactness of the regenerative portions of the lamp, enable it to be fixed with the burner within 15 in. of the ceiling and sufficiently far above the head to prevent any sensation of radiant heat from it, whilst the air supply to the flame is so arranged as to be undisturbed by the up-draught created in the flue attached to the lamp. In order to convert the lamp into an efficient ventilating agent, it is set in a metal box, which may be ornamental, and which fits into the ceiling space, and has its lower portion, with the lamp attached, projecting downwards into the room, and this part is provided with openings into the room. The upper portion of the box, in the ceiling space, has a flat rectangular flue attached to it, which passes alongside the joists and is led into the flue of the room illuminated by the lamp, or into a special flue fitted in the chimney stack. Under these conditions a No. 4 Wenham lamp, consuming from 20 to 24 cubic feet of gas per hour, gave as an average of illuminating power from 120 candles in a horizontal plane to 280 in a vertical, whilst a current was created in the flue with a velocity of 12·5 feet per second, and the area of the tube being 6 in. by 4 in., this was equal to 7,498 cubic feet per hour. The temperature of the gases in the flue 4 in. from burner was 276° F., but the air in the room was at 60° F., and reducing the volume to this temperature and deducting the air used up by the lamp, we have 5,160 cubic feet of air over and above that required by the lamp, removed from the upper part of the room to be replaced by cool fresh air, whilst none of the products of combustion are allowed to find their way into the room. With a No. 2 lamp, burning 10 cubic feet per hour, 2,000 cubic feet of air per hour was withdrawn from the room.

In order to fully realise the importance of these results as bearing upon ventilation, one must remember that nearly all the impurities in the air emanate either from the body or from the combustibles used, and are therefore at a higher temperature than the normal air of the room, with the result, that being expanded by heat, they are lighter and rise to the ceiling, so that the air withdrawn by the burner is not the ordinary air of the room, but the foulest air in the room.

In order to test the safety of the flues passing through the ceiling space, a number of experiments were made as to temperatures of the products of combustion and the exterior surface of the flues.

The metal box containing the lamp is double-jacketed with 1½ in. of "silicate wool," which, being fireproof and a non-conductor of heat, prevents the escape of heat anywhere near the lamp, the highest temperature ever reached being 90° Fah. The flue which conveys the mixed products of combustion and air from the lamp casing to the chimney were jacketed with ¾ in. of silicate wool, in the hottest part rarely reaches 100° Fah., whilst if the flues be packed round with loose silicate wool, kept in position by a layer of loose slates placed on it, no heat at all escapes.

As regards the heating effects of regenerative burners on the air of a room, the kind of heat given out is almost entirely radiant heat, which does not heat the air directly, but heats the walls and furniture in the room, and these in turn heat the air, whilst in the old forms of burner the air is rapidly heated by convection, radiation playing but a small part in the heating of the room. In the first instance you have warm walls and furniture with cool air, which are undoubtedly the conditions best suited for health and comfort, whilst in the second case you have warm vitiated air with cold walls,—a state of affairs which leads to chills and discomfort to the system.

The amount of radiant heat given out by a regenerative burner is considerable close to the lamp, but rapidly diminishes as the distance from it increases, so that 5 ft. from the burner of the lamp it is hardly perceptible and only amounts to about two-tenths of a degree, and this may be entirely done away with by suspending a sheet of thin plate-glass just below the lamp, which, while cutting off the heat rays, will allow 88 per cent. of the light to pass through.

Amount of Oxygen removed from the Air, and Carbonic Acid Gas and Water Vapour generated to give an Illumination equal to 32-candle power (the amount of Light required in a Room 16 × 12 × 10).

ILLUMINANT.	Quantity of Materials used.	Oxygen removed.	PRODUCTS of COMBUSTION.		Adults.
			Water Vapour.	Carbonic Acid.	
Sperm Candles	3,840 grains.	19·27 cubic feet.	13·12 cubic feet.	13·12 cubic feet.	21·8
Paraffin Oil	1,984 grains.	12·48 ,,	7·04 ,,	8·96 ,,	14·9
Gas (London)—					
Burners:					
Batswing	11 cubic feet.	13·06 ,,	14·72 ,,	5·76 ,,	9·6
Sugg's London Argand	9·7 ,,	11·52 ,,	12·80 ,,	5·12 ,,	8·5
Welsbach (incandescent)	5·3 ,,	6·30 ,,	7·10 ,,	2·75 ,,	4·6
Wenham (regenerative)	3·2 ,,	3·68 ,,	4·16 ,,	1·60 ,,	2·6

Mr. John Slater, B.A., in opening the discussion, said he had very much enjoyed Prof. Lewes's lecture. He was not aware to whom they owed the pleasure of having heard it, but he was inclined to believe that the Standing Committee on Literature had had something to do with it, and some other papers that had been read during the present session, and if that were so it was sufficient justification for the establishment of that Committee (applause). One advantage of the Wenham light was that the illuminating power was nearly equal at all angles. An ordinary batswing burner would give much more light in one direction than in another, and it was a great advantage to have, as it were, a sort of side light distributing illumination in all directions. Professor Lewes had referred to the advantage of having less oxygen removed from the air by the burners in use. Professor Tyndall was, he believed, the first to make some experiments with regard to sound, and found that the transmission of sound was very considerably interfered with by certain actions which he could not at first understand, but which turned out to be the juxtaposition of a number of layers of air of different densities. That showed how important

t was in large rooms, where acoustic properties were essential, that as little of the oxygen as possible should be consumed, and that there should be as few as possible of the layers of different densities. Another point they were all familiar with was the fact that draughts depended very much on the rate at which fresh air was introduced into the room. If air was introduced slowly no draught was felt, but if, on the other hand, it was introduced at a rapid rate, every one would feel the draught. If, then, the oxygen was removed too quickly, and in too large quantities, they were obliged, for the sanitation of the room and the comfort of its occupants, to introduce fresh air much more quickly. Mr. Slater concluded by proposing a hearty vote of thanks to Professor Lewes.

Mr. A. W. Blomfield, A.R.A., seconded the vote of thanks.

Mr. Ralph Nevill, F.S.A., said that it was very necessary to have some means of controlling the exit of air from the room, because, as Mr. Slater had said, the great difficulty was in the admission of fresh air. Any one who had tried experiments in ventilation knew that, however perfect a system might be, it must be modified from time to time. He himself had done feats of ventilation in old-fashioned rooms such as had been mentioned, but only by frequently jumping up and opening, shutting, or regulating some valve or other as temperature, &c., changed. Whatever was done in the way of providing means for the admission of air, not one man in a hundred would take the trouble to open a ventilator. Professor Lewes had said that the electric light could not be made a means of ventilation, but that was hardly correct. There was an amount of heat given off from all ventilating lights which, he believed, would be sufficient to create a certain up-draught. In theatres, underneath the galleries, the electric lights were set in a funnel, and if these funnels were led into a tube, although they would not create so strong a draught as gas, yet the heat would be sufficient to help in the ventilation of the place.

Mr. Thomas Blashill pointed out that the arrangement for the ventilating-tube referred to by Professor Lewes, would be impracticable in something like thirty-nine out of every forty houses; first, as a matter of prudence, and, secondly, as a matter of law. It was almost a necessity in London houses to construct the floors with the joists running from front to back.

A member suggested that in such cases the best way would be to conduct the flue to the outside, and then bring it round between the joists to the chimney.

Professor Lewes said it would be as easy to box in the flue, and to case the tube outside. He quite admitted that the existence of draughts was the great difficulty in connexion with ventilation, but he believed that would, to a large extent, be got over by having the tubes delivering air into the room above the level of the head.

Mr. J. Douglass Mathews remarked that his experience of the Welsbach light was that its radiant heat was small, whereas that of the Wenham light was great. He was referring to a small unventilated light, the result of which was that the amount of heat at the ordinary height above the table was very great, which was not the case with the Welsbach light.

Professor Lewes said there was a certain balance of heat, and, to a certain extent, it was an advantage to have radiant heat warming the air and the walls of the room. Non-ventilating burners had necessarily to be kept lower down from the ceiling than the ventilating lights, hence the heat was very appreciably increased by persons sitting under it.

Professor Aitchison, A.R.A., stated that he had used the Hammond light largely. There was one difficulty to which Professor Lewes had given a solution. Where the joists ran the wrong way it was extremely difficult to get the flue into the chimney, and in old houses where it had been carried outside there was such a rush of cold air down the tube that it was impossible to see by the light, and people had to use some other illuminant. He was happy to hear that that could be cured by casing the pipe with silicate wool or something of the kind.

Professor Kerr said he had always been under the impression that the great mistake of architects' ventilation was the smallness of the outlet flue. He had been accustomed to put it to himself in this way,—that the air travelled at its own pace, and that if they made a small flue it provided an outlet involving a pace which the air was indisposed to assume. Therefore, the larger the area of the ventilating flue the better it was.

Professor Aitchison added that when the "Tobin" tubes were first introduced they were considered an admirable invention, but he had since noticed that in almost every place where they were used they either were fitted with a cover, or had a large book placed over them. At his club, on one occasion, he was speaking to some friends of the great advantage the tubes had conferred on the room, when, on looking round, they found "Post Office Directories" put on all the tubes. The steward, on being interrogated about it, said it was an excellent invention for putting the Directories upon, and that it was impossible to sit in the room when they were taken off (laughter).

Mr. Hall said he had found it a great help to bring the Tobin tubes out so that it had a vertical outlet, filling it with a piece of fine copper gauze, which had the effect of scattering the air into small currents. With regard to the difficulty about smoke coming back when the fire was lit, that could be obviated by putting a small mitre valve at the end of the horizontal shaft before it entered the flue.

The vote of thanks was then put and carried by acclamation.

Professor Lewes briefly replied, and added that in his complete paper would be found many details which he had not had time to give in his lecture.

The proceedings then terminated.

THE "HEIM" SYSTEM OF HOUSE HEATING.

SIR,—I think it may be of interest to your readers to have a description of a system of house-heating and ventilation in operation in Austria that is remarkable for the simplicity of its construction, for its efficiency as a generator of pure hot air, and for the complete control exercised over every department of its arrangements and its objects. The patent is the property of Herr Heim, of Vienna, who has also secured the patent for Great Britain; the factory is at Döbling, just outside the city.

The manufacture is of two kinds:—(1) The stove-heating system, in which the stove is placed in the room to be heated, or in a dozen rooms, if desired; and the central-heating system, in which the calorifers, or fire-holders, are placed in a brick-built air-chamber in the basement of the building to be wholly warmed, as from this chamber fresh air from without is introduced, warmed, and conducted to staircases, corridors, and rooms through channels made in the walls.

In the first system the stoves are placed in the walls of the rooms or in the rooms themselves; they consist of a cylindric cast-iron combustion chamber, so made that a defective part, should there be one, may be removed at any time without necessitating the removal of the whole; this cylinder is surrounded by a metal casing, and this casing is covered by another, plain or ornamental, extending downwards to the floor, having at its side a lever mechanism controlling two valves,—one at the end of an air-channel extending from the outside of the building to the floor beneath the stove, the other closing the stove at its top. The combustion cylinder and the inner sheet iron casing are placed about 12 in. above the floor. This cylinder has two throats projecting sideways through both metal casings, — the upper, for the reception of the fuel, the lower for regulating the fire and for removal of the small quantity of ashes that may be made; at the back of the cylinder is a system of pipes or flues through which the hot gases pass in the process of heating. The regulation of the combustion is very simple and effective. The lower door is displaced laterally, and in order that the draught, when once regulated, shall not be interfered with by any unauthorised person, a lock is provided the key of which is retained by the firemen alone. Through flues within the walls extending to the roof provided with adjustible valves the vitiated air of the rooms is drawn off.

In order to test the reliability of these stoves for their work the Town Council of Vienna not long since made an experiment of the system in their house for the poor at Liesing, in which there were forty-two stoves, with the following result in Room No. 7, which was a sample of the whole of the rooms to which the test was applied.

At 8 a.m., out-door temperature was 4° Fahr.; at 2 p.m., 10°; cubic contents of ground-floor tested, 14,187 cubic feet; room underneath not heated; room at side partly heated and partly exposed to the outer atmosphere:—

Hours at which tested ...	9	10	11	12	2	3	4
Temperature	77	77	75·5	74	75·5	72	77

Fires were lighted at 18 minutes to 7 a.m.; at 28 minutes past 7 the temperature was raised to 76°, when it became necessary to open the air-valve. The Committee engaged in the examination declared that in the fourteen rooms to which the test had been applied the results were eminently successful. The consumption of coal was 67¾ lb., and about 1 lb. of soft wood for lighting it, whilst the tests made with the anemometer proved that the whole of the air was changed on an average more than once an hour. The temperature was raised in these large rooms to 76° in forty-six minutes, and was maintained with but slight variation during the whole time of the trial.

To further prove the value of the system for house-heating purposes in public institutions, the Vienna Town Council experimented in the Elementary School in the Alleegasse, with the following result:—

Hours of testing ...	8·30	9·30	10·30	11·30	12·30	1·30
Temperature out of doors	35	...	...	...	...	41
Temperature within doors raised to ...	54	63	62	63	62	62

From 9·30 a.m., the air was changed one-and-a-half times an hour; the consumption of coal was 10 lb. Thus it will be seen that the temperature for comfort in every room was quickly reached and fully maintained during the time of the trial, whilst the consumption of coal was remarkably small.

The apparatus for central heating and ventilating buildings of any dimensions is not only original and effective in its general arrangements, but, on the point of hygienics is superior to any other system I have seen. Among other buildings in which this system is at work, I recently inspected it in the Girls' Primary School in the Gumpendorferstrasse, Vienna; there are thirteen class-rooms with staircases and corridors; it is an old building. The system of heating formerly used was removed in order to adapt the school to Herr Heim's process. Six calorifers were placed in the basement within four furnace-chambers. I also saw it in operation in the primary and burgher schools for boys and girls, in the Hörnesgasse, —a new building having thirty-two class-rooms, two large gymnastic halls, with staircases, corridors, &c., having a total cubic capacity of 447,789 cubic feet. The whole was heated by twenty-four calorifers placed within eleven air-chambers, and I say emphatically that, for comfort and equability of temperature throughout the building, coupled with the purity of the air, I have found no other system in any degree equal to that in use in these buildings. In both instances my visit was totally unexpected.

The construction and arrangements of Herr Heim's central-heating system may be thus described:—the hot-air brick-built chamber is placed in the basement of the building, for whatever purpose the building may be designed. Into this chamber, through an aperture in the walls protected by an iron-wire screen, the fresh air from without is introduced. The passage is so made that any dust that might pass through the screen, will fall in the passage on the way; the passage can at all times be easily cleansed. At its inner end is a throttle-valve, by which the quantity of air supplied to the furnace is regulated. The air, on entrance, is conveyed into a second passage arranged behind the furnace-chamber, into which it streams, and rises in a heated condition through ducts into the rooms to be heated; or it may flow directly by a throttle-valve into the said ducts without passing through the heating process, and so be conveyed with the hot air into the room in a mixed condition as the temperature of the room may require, so that, whatever the temperature out of doors may be, the power of control over the temperature of the room or of the house is absolutely in the hands of the fire-attendant. For any purpose required the heating chambers can be entered by the attendant at all times; the heating bodies are so made that unequal dilation of any part or parts of the same can never cause any

leakage of the joints; each furnace consumes its own smoke. By means of easily-supplied water-tanks the necessary air-moisture is ensured. All the heating apparatus for a large establishment are served by a single servant, and all need for erecting lifts so as to convey coal to various parts of a house, or for the necessary manual labour for this purpose, is entirely dispensed with.

To ascertain and govern the temperature in any part of the building, two alcohol thermometers are placed in each room,—one in a prominent position in the room open to be examined by everybody therein, or it may be seen from the corridor through a glazed aperture in the door itself, so as to render entrance into the room unnecessary, and the class is undisturbed. The second is contained in a small box in the wall of the room. When the fire attendant in the basement of the building desires to know the temperature of any special room, by a very ingenious arrangement (invented by Herr Paul, the surveyor of buildings for Vienna), he pulls this thermometer down to the basement where he is at work, from any floor or room he pleases, through the channels made for it in the walls, ascertains the exact temperature of the room, and then returns it to its former position; thus the fireman is enabled to ascertain the temperature without trouble at any moment, and to adjust the mixing valves accordingly for that special room, or for the whole building. These thermometers are used in all ventilating and heating apparatus in municipal buildings in Vienna.

The prices of the calorifers used in this central heating system are extremely moderate. In the case of new erections the costs incurred in providing the ordinary flues would more than cover the necessary provision of air-ducts; whilst on the question of economy as to the quantity of coal or coke consumed, an immense saving is secured by Heim's system. This can best be illustrated by giving a case in point,—in the Marylebone Infirmary at Notting Hill there are, with inmates and staff, about 800 persons. For all purposes of heating, cooking, &c., the coals consumed at this infirmary amount to 160 tons a fortnight, or nearly twelve tons a day. From 80 to 100 tons of this quantity is said to be required for heating purposes. If Heim's central heating were in use in this infirmary the heating throughout would be far more effectually accomplished than now, and with a saving in the quantity of coals consumed of at least forty tons a fortnight, with a complete absence of all present fire-risks and all other annoyances connected with large open fireplaces in large rooms, whilst the services of ten or more inmates now daily engaged in keeping the fires supplied with coal would be dispensed with.

The School Board for London is constantly dealing with cases of inefficient heating in numberless schools and class-rooms; it has, therefore, determined to give Herr Heim the opportunity to make a fair trial in both forms of his patent,—of the stoves, in rooms wherein every system yet tried has failed; and of the central heating, in a new school about to be built, the plans for which will provide the necessary arrangements so as to give to the system a most thorough and complete test.

J. Russell Endean,
Member of the London School Board.

THE WIMBLEDON SEWERAGE WORKS.

SOCIETY OF ENGINEERS.

At a meeting of the Society of Engineers, held at Westminster Town-hall, on Monday evening last, Mr. A. T. Walmisley, President, in the chair, a paper was read on "The Wimbledon Main Drainage and Sewage Disposal Works," by Mr. W. Santo Crimp, Assoc.-M. Inst. C.E., F.G.S.

The author stated that the population of the district at the present time was about 25,000, and its area 3,220 acres, 640 acres of which form the Wimbledon portion of the Common. Three main outfall sewers had been constructed for the drainage of the district; the sewage from one of them requires to be pumped, whilst that from the other two gravitates to the Sewage Disposal Works.

Several miles of sewers were in existence at the period when the works described were commenced, and these were retained for the disposal of the surface water. The works have been largely added to by the author, and a new outfall for the western portion of the district constructed. Concrete tubes have been largely used.

All the roads now made up under the 150th section of the Public Health Act are provided with duplicate means of drainage, and the entire scheme offers a good example of the "separate" system, the advantages of the axiom, "the rainfall to the river, and the sewage to the land," being both fully recognised and acted upon.

The works designed by the author for remedying the defective portions of the low-level outfall consist of a pumping-station and about two miles of new outfalls, situated in the western part of the district. The new western outfall was constructed sufficiently deep to admit of all the building land in that part of the district being drained when it should become necessary to do so hereafter. The pumping-station is provided with pumping machinery in duplicate, operated by a pair of "Otto" gas engines.

The sewage is lifted into a large tank holding nearly 20,000 gallons, which, when full, discharges its contents into the 18-inch outfall, which is thus effectively flushed at least twice daily. Five automatic flushing-tanks were also constructed at various portions of the system where most required, each tank being provided with one of Field's annular syphons. The total cost of the remedial works was about 12,000*l.*

All the sewers were originally ventilated by means of open street gratings, but these have for the most part been closed and ventilating pipes put up in lieu of them.

The total sum expended by the Local Board on the main drainage works amounted to 60,000*l.*, but in addition large sums have been spent by private landowners in the construction of roads and sewers, for the purpose of developing their estates, so that the whole of the main sewers of the district have cost not less than 100,000*l.*

The author then described the main pumping-station and machinery, and the six settling-tanks for the reception and precipitation of the sewage from the mid and low level outfalls, arranged to work either on the continuous or separate system as desired. The sewage is treated with milk of lime and sulphate of alumina, in the proportion of eight and six grains per gallon respectively. The solids are precipitated and the effluent water is then conducted over the farm, which is 73 acres in extent. In very hot weather a little permanganate of potash is also used. The normal sewage flow is 750·000 gallons per day. The precipitated solids are dealt with by means of filter-presses, three of which presses are now employed. Experiments made with this sludge prove it to be of slightly higher value as manure than ordinary stable manure. The farm as originally laid out consisted of 47 acres of somewhat clayey land, but a further area of 26 acres has since been added. There are also three filters of burnt ballast, having an aggregate area of 2½ acres, and a depth of 3 ft., for the treatment of storm waters. Great care is taken in applying the sewage so as to prevent any of it finding its way direct to the subsoil drains. The principal crops grown on the farm are rye-grass, mangolds, and osiers. The total receipts for produce, for the year ending March 25th, 1888, was 20*l.* per acre, and the inclusive working expenses were about 12*l.* per acre. After deducting the profit on the farm, the net annual cost of pumping, deodorising, and purifying the sewage, including all expenses, is 3,690*l.*, equal to a rate of 6·15d. in the pound.

Grants of Patents to Foreigners.—The law about granting patents to foreigners wants mending. Mr. Watson Smith, a lecturer on chemistry as applied to the arts, said the other day, with regard to a process that was about to be patented, it was found that almost every imaginable improvement had already been patented in the same way, by foreigners who had never worked or made any attempts to utilise the improvements in England. This is giving our foreign competitors a little more than fairplay. It is an intolerable absurdity that a foreign manufacturer, having hit on some happy idea for cheapening production, should be able to debar Englishmen from sharing in the benefit of it by the simple taking out of a patent, unaccompanied by any attempt to work it.—*Pump Court.*

THE ARCHITECTURAL ASSOCIATION

SOIRÉE.

The annual *soirée* of the members of the Architectural Association was held on the 6th inst. in the Westminster Town-hall, and was, as usual, largely attended. The principal item of the programme was what was described as a "comedietta," entitled "Perdition, or, the Virtuous Students, the Artful Architect, and the Blighted Bride." The scene was laid at "9, Conduit-street, W. (as it should be)." The first act revealed *Lord Whitehall Yarde* (Mr. G. Richards Julian), *Mr. Reginald A. Buncrumpet, M.A.* (Mr. F. W. Marks), and *Herr Harvey Sorze*, successor to Professor Sempiterna, and sole proprietor of the "Celebrated Secret" (Mr. H. O. Cresswell), three members of a certain Institute, who had been despatched to Japan as a Special Commission to inquire into the state of architectural education in that country. The Commissioners were attired in Japanese costume, with the exception of the felt hat of *Lord Whitehall Yarde*, whose facial "make-up" was a very good rendering of the well-known original. After these Special Commissioners have given it to be understood, by song and speech, that they had "a high old time of it" during their sojourn in the "land of the rising sun," they retire from the stage for a time, and thereupon enter two students, *Palladio Jones* (Mr. A. C. Bulmer Booth), and *Paris Plasterio del Nuovo-Cutto* (Mr. C. G. Killmister), and the following dialogue ensues:—

Nuovo-Cutto.—Have you heard the news?
Palladio Jones.—What news? Have they reduced the Associate's subscription, or allowed Fellows to take out quantities?
Nuovo-Cutto.—No; but the Commissioners have returned from Japan.
Palladio Jones.—Oh, have they? Well, what of that?
Nuovo-Cutto.—What of that? Why, everything! They have settled that now all is to be decided, as it is there, by examination! No longer will everything go by favour. Jobbing will cease, and genius will arise!
Palladio Jones.—Your news is indeed good!
Nuovo-Cutto.—Oh, Palladio! Something within me says we shall be great!
Palladio Jones.—I feel it, too!
Nuovo-Cutto.—Something whispers that we shall erect buildings that will rival the Law Courts for excellence of planning, or the new Surgeons' Hall on the Embankment for beauty of elevation. Perchance even the——
Palladio Jones.—Plasterio! you have a great soul!

So discoursing, the two students advance to the front of the stage, and sing a duet to Sullivan's air, "A Waterloo House Young Man." The first stanza, sung by *Nuovo-Cutto*, is as follows:—

"I'm a Heddon-street *atelier* man,
On Millard & Baggallay's plan;
With an *Ecole des Beaux Arts*
Ou tout autre chose homme,
Compare me if you can!"

Palladio Jones sings another verse proclaiming that he's a "F. R. Farrow young man," with a far-fetched pun to the effect that he thrives upon "farrownaceous food." Then the two students combine in the chorus,—

"We're prepared for any Exam.,
We well know how to cram
With the *Ecole des Beaux Arts*
Ou tous autres choses hommes,
Compare us if you can!"

While thus engaged in mutual encouragement and incitement to be diligent students, they are both much perturbed and distracted by the appearance on the scene of *Mary Anderson Perdita* (Mr. Frank Galsworthy), the lovely daughter of *Lord Whitehall Yarde*. The "young lady," lyre in hand, dances gracefully. The too-susceptible students with one accord proceed to "make love" to her, but finding themselves in each other's way, they without delay "toss-up" to see which of the two shall remain. The lucky man is *Palladio*, and he at once ingratiates himself with the lady by promising to build her "a nobby dwelling," "roofed with some real art tiles." But in this case, as in many similar cases antecedent to it, the course of true love was interrupted, for the lady's father, enthusiastic in the cause of professional education, declares his intention of giving his daughter in marriage to the student who succeeds in obtaining the highest number of marks in the coming examination. The father's intention is, however, frustrated, for an impossible *Member of the Board of Works* (Mr. Francis Miller) subsequently persuades the fair *Perdita* to elope with him.

In the scene where the Commissioners are discovered discussing the scheme of Examination, one of them suggests that as some of the candidates will probably be Church architects, "a knowledge of the Thirty-nine Articles"

might be useful to them. Another Commissioner expresses his views in these words,—"I think it is much better to begin at the beginning, as Professor Semper teaches. Ask them how they came by their clothes. Then you can lead up to building, and so on." The Chairman of the Commissioners (*Lord Whitehall Yarde*) suggest that they should include sanitary science, whereupon a hybrid being, half doctor, half plumber (Mr. T. E. Pryce), suddenly appears, and warns the Commissioners that they are trenching on *his* domain. He warns them to refrain from interfering with *his* work, threatening to "put" Lord Grimthorpe "on to" them,—a threat which appears to be effectual. The two students now enter, and the Examination proceeds. The following brief extracts will show the nature of the travesty:—

Chairman.—What is the difference between a portico and a pericardium?

Nuovo-Cutto.—If you please, my lord, I have been studying from the "Dictionary of Architecture," and it has not got up to P yet!

Chairman.—Now, please inform me, in carrying out a job, what means would you take to circumvent the District Surveyor?

Palladio Jones.—I don't think there is any necessity for us to know that.

Chairman.—Why not?

Palladio Jones.—Because, where I live, the District Surveyor collars all the jobs himself!

Subsequently, the Commissioners meet to consider their report. The Chairman is complimented by his fellow Commissioners on his enthusiasm on behalf of Education, whom he apostrophises thus:—

> "O Education! virtuous maid,
> Whene'er I think of thee,
> I work from morn till evening's shade,
> As doth the busy bee!"

During this *sederunt*, the servant announces a visitor, "the Chairman of a Committee for the Abolition of Architects, Surveyors, and Engineers, and the Substitution of Registered Practitioners." As he brings no proper credentials, the Commissioners decline to discuss matters with him. Two of the Commissioners subsequently quarrel, and, heedless of the Chairman's advice to "refer the matter to arbitration," they proceed to settle their differences by a resort to fisticuffs. The impossible member of the Board of Works, after a brief period of *dementia* brought about by haunting visions of *sights* he has seen, having resigned his seat on the Board, becomes "a reformed character," and as for the hybrid doctor-plumber, he is finally condemned to "always live in a house whose sanitary arrangements have been carried out entirely on his own principles."

The "plot" of the piece was not very coherent, but this was in great measure atoned for by the able manner in which the various parts were delineated. Mr. Frank Galsworthy's "make-up" as *Perdita* was a very close copy of Miss Mary Anderson's impersonation. Mr. R. A. Briggs acted as accompanist, some of the songs in the piece having been composed by him. The orchestra was led by Mr. J. Davis.

Royal Institution.—The following are the "Probable Arrangements" for the Friday Evening Meetings after Easter:—April 13th, Professor Flower, C.B., LL.D., F.R.S., on "The Pygmy Races of Men"; April 20th, The Right Hon. Sir William R. Grove, M.A., D.C.L., LL.D., F.R.S., M.R.I., on "Antagonism"; April 27th, Mr. James Wimshurst, M.R.I., on "Electrical Influence Machines"; May 4th, Mr. J. K. Laughton, M.A., R.N., Professor of Modern History at King's College, London, on "The Invincible Armada: a Tercentenary Retrospect"; May 11th, Mr. William Henry Barlow, F.R.S., F.R.S.E., M. Inst. C.E., M.R.I., on "Building the New Tay Bridge"; May 18th, M. Alphonse Renard, LL.D., Hon. M.R.S.E., Cor. G.S., Curator of the Royal Museum, Brussels, on "La Reproduction artificielle des Roches volcaniques" (in French); May 25th, Mr. Francis Galton, M.A., F.R.S., M.R.I., on "Personal Identification and Description"; June 1st, Professor J. A. Ewing, F.R.S., University College, Dundee, on "Earthquakes and how to measure them"; and, June 8th, Professor Dewar, M.A., F.R.S., M.R.I., subject not announced.

Surveyorship Appointments.—Mr. H. C. Crummach, of York, has been appointed Surveyor to the Corporation of Hartlepool, at a salary of 200*l.* per annum, in succession to Mr. Hugh Mair, who has just been elected Surveyor to the Vestry of Hammersmith, London.

Illustrations.

DESIGN FOR NEW EXCHANGE, AMSTERDAM.

THIS design was submitted in an International competition held in 1884, but was not placed.

The site proposed was a very long and narrow one, and presented great difficulties in planning owing to the large area stipulated for in the conditions, and altogether the building shown would be upwards of 600 ft. in length,—the principal tower rising to a height of 220 ft. above the pavement, and costing about 2,000,000 florins.

The design is based upon the best Dutch work, careful studies and measurements of which were made before the design was prepared.

We have placed on the drawing the names of the three partners of the firm of Messrs. Potts, Sulman, & Hennings, as now formally known, but we are requested by Mr. Hennings to say that the design was really the work of Mr. Sulman alone, who is now abroad.

DESIGNS FOR STAINED GLASS:

BY MR. E. BURNE JONES, A.R.A.

THESE, like some others which we have had the pleasure of publishing, are reproductions from cartoons by Mr. Burne Jones for windows executed by Messrs. Morris & Co. The design of St. Anne and the Virgin was made for a window at Brighouse, and that of the Sacrifice of Isaac for one of the windows in Jesus College Chapel, Cambridge. The illustrations are reproduced from photographs by Mr. Hollyer.

SHELDON MONUMENT, BEOLEY CHURCH, WORCESTERSHIRE.

THE village of Beoley lies about three miles from Redditch, touching the boundary line between the counties of Worcester and Warwick. The church stands on a steep ascent, from the summit of which is to be gained a view of as charming a country as can be seen anywhere in the Midlands. The building is mostly of fourteenth-century work, and consists of nave and aisles without clearstory, western tower, chancel approached by a flight of five steps under a low Norman archway, and on the north side of this the Lady-chapel, containing the Sheldon memorials.

The Manor of Beoley formerly belonged to the great Beauchamp family, but was sold in the time of Edward IV. to William Sheldon by Lord Latimer, grandson of Elizabeth Beauchamp, Lady Latimer, the daughter of Richard Beauchamp, Earl of Warwick.

The Sheldons were, doubtless, a branch of the ancient house of Sheldon, of Sheldon, in the Hundred of Hemlingford, in Warwickshire, but their descent is directly traced from Richard Sheldon, of Rowley, county Stafford, from whose second son, Maurice, was descended the William Sheldon, of Balford Hall, who purchased the Beoley estate from Lord Latimer. He died in 1517, and was succeeded by his brother Ralph, whose son William is the Sheldon of the monument illustrated. This William Sheldon was a man of considerable note in his day, and is said to have introduced the manufacture of tapestry into England. He died at Skiets, an adjoining mansion in his possession, December 23, 1570; and was buried in Beoley with great pomp and ceremony, the heralds coming down from London, January 15, 1571. The monument was erected by his son Ralph, who also, according to Nash, "built a handsome chapel adjoining to the church of Beoley in the same style with that of Judge Berkeley at Spetchley." He died March, 1613; and on the death of another Ralph in 1684, his brother Edward, a Benedictine monk of Douay, having declined the succession, the estates, worth at that time 3,000*l.* per annum, passed to a cousin, Ralph Sheldon, of Steeple Barton, Oxfordshire, whose descendants retained them, the last of the family dying in London and being buried at Beoley in 1822.

The Lady Chapel measures about 24 ft. by 19 ft. 6 in., and is interesting as having been erected during the Transition period. The east window of five lights shows a curious attempt by the Renaissance workmen to reproduce Perpendicular tracery. The monument to William Sheldon and another to his son Ralph, somewhat similar in design (an ornamental sarcophagus bearing effigies of the squire and his lady under an elliptical archway, having on each side detached shafts supporting an entablature and surmounted by a florid shield panel), but poorer in detail, are built in the wall between the chancel and the chapel. There can be little doubt that the monument illustrated was the work of Italian artists, who probably lived in the village during its execution, as the stone was obtained from a Worcestershire quarry. The stonework was originally elaborately decorated, but the colours, both of the ornament and of the shields, have been all but obliterated. The stone altar of the Lady-chapel, a fine one of pure Italian work, is said to have been a gift from the Pope to Squire Ralph, *c.* 1580.

The monuments are in a fair state of preservation, but the roof of the chapel is in an exceedingly dilapidated condition. The vicar is hoping to obtain sufficient subscriptions to effect such repairs as will preserve the memorials from injury, and to restore the chapel, now used as a Sunday School, to its original purpose of sacred worship.

CHIMNEYPIECE, HOLDENBY HOUSE.

THIS pleasing specimen of early Jacobean work is in the library of Holdenby House, about seven miles from Northampton. The chimneypiece is an oak one. The illustration is from measured drawings by Mr. F. W. Littlewood.

QUEEN'S-ROAD WESLEYAN CHURCH, NORTHAMPON.

THIS church is being built to supply the demands of an increasing population in a new part of the town, and is situated at the corner of Queen's-road and Kettering-road.

The church measures internally 60 ft. by 46 ft. 6 in., and will accommodate on the ground-floor 490 people; there are also galleries all round, which will hold 350, making a total accommodation of 840 people.

Attached to the church there are ten class-rooms, one large room for week evening services, &c., 27 by 24; also a school-room, 54 by 46, with lavatories, boiler-house, &c. The building externally is faced with Gayton bricks, relieved with Bath stone dressings.

The height of the spire is 90 ft. The contract, which was let to Mr. Wm. Heap, was 3,220*l.*

The architects are Messrs. H. H. Dyer & Son, of Northampton.

PROPOSED RESIDENCE, NEAR BRIGHTON.

THE residence is proposed to be erected on a piece of ground near the Dyke-road, leading to the Devil's Dyke, Brighton, for Mr. J. Netherton. The materials are dark red facing bricks, the pointing being cut back so as to show the under edge of each brick and cause a shadow under every joint. The walls are hollow, and tied with iron ties. Dressings, string-courses, &c., of Doulting stone. The situation being exposed, the roof is to be boarded and covered with felt, on the top of which cross battens are to be laid, leaving a cavity so that any snow, rain, &c., driving under would run out at once instead of lodging against the ordinary battens and soaking through. The roofs are to be covered with dark Staffordshire tiles. The approximate cost is 7,000*l.* Mr. George W. Webb, of Reading and London, is the architect.

Altar Frontal, Tamworth Parish Church.—Messrs. Jones & Willis have this Easter completed for Tamworth Parish Church a richly-embroidered white silk altar frontal. It is divided into three panels by orphreys of bold design, embroidered in colours, and terminating at each end with stars shaded in gold. In the centre panel is a floriated Greek cross worked in shades of orange and golden green, and having the sacred monogram in gold, on a red ground in centre. The side flowers are conventional lilies in shades of light blue and golden green, the super frontal being embroidered with pomegranates, alternating with pointed stars in gold. The fringes are woven in soft shades of the prevailing colours of the embroidery.

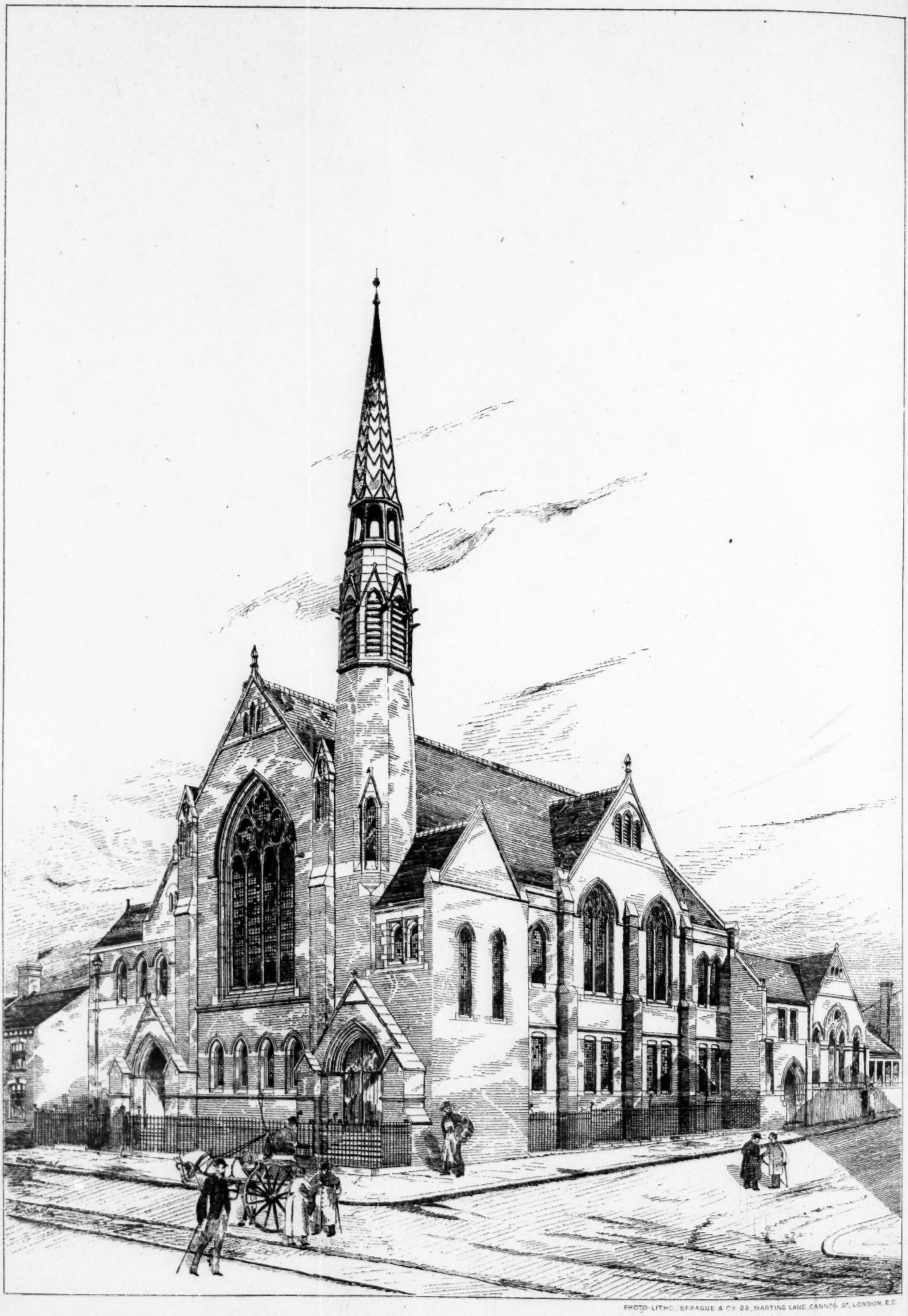
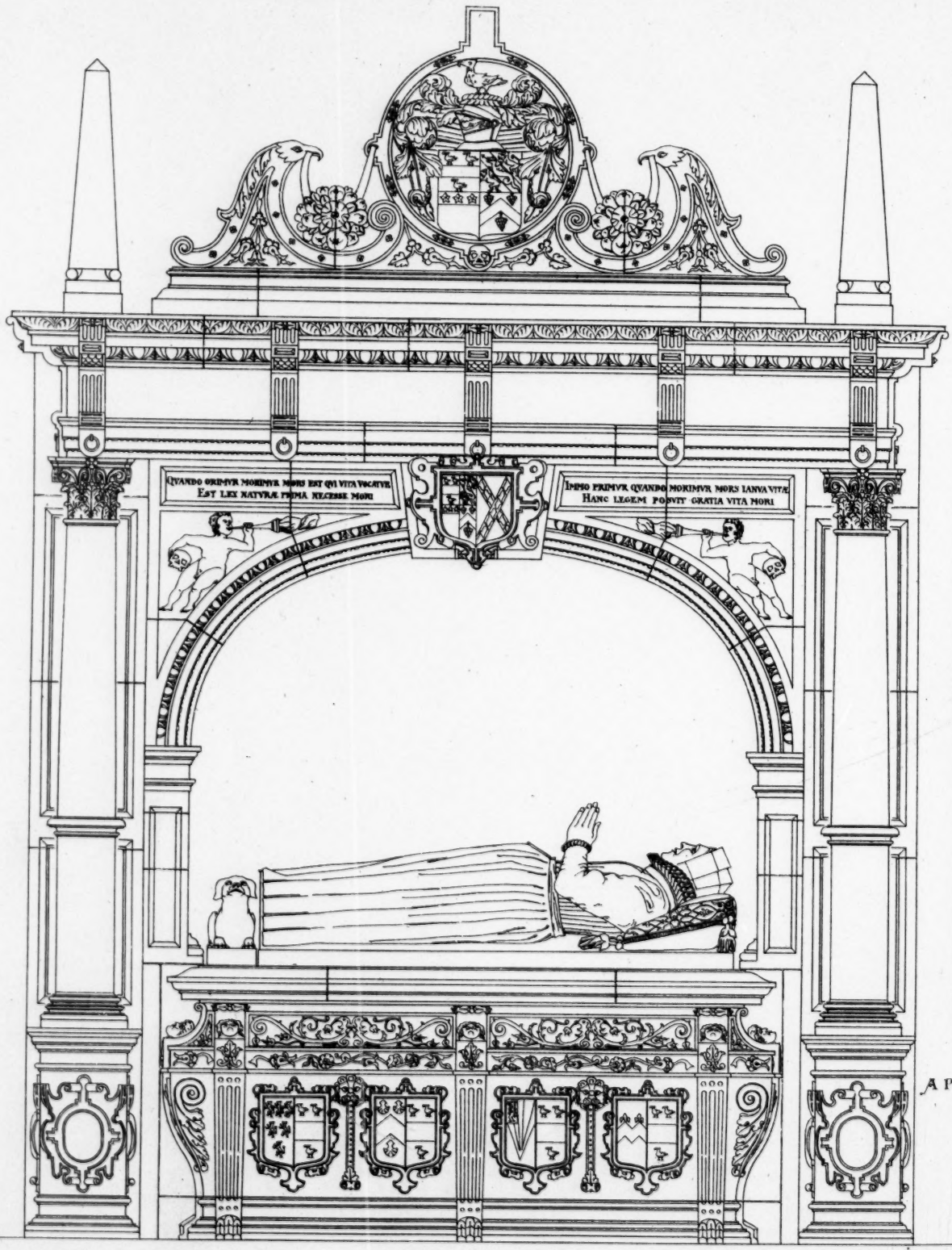


PHOTO-LITHO., SPRAGUE & Cº 22, MARTINS LANE, CANNON ST, LONDON, E.C.

QUEEN'S ROAD WESLEYAN CHURCH, NORTHAMPTON.—Messrs. H. H. Dyer & Son, Architects.

MONVMENT TO WILLIAM SHELDON AND HIS WIFE

ST LEONARD'S CHVRCH, BEOLEY, WORCESTERSHIRE.


QVANDO ORIMVR MORIMVR MORS EST QVI VITA VOCATVR
EST LEX NATVRÆ PRIMA NECESSE MORI
IMPSO PRIMVR QVANDO MORIMVR MORS IANVA VITÆ
HANC LEGEM POSVIT GRATIA VITA MORI

A Pilaster behind Column

Floor of Lady Chapel.

A.A.M.C. del:

Scale 1 0 1 2 3 4 5 feet

W. H. Kendrick
A. A. M'Connal } Mast.
Aug: Col: 1887.

PHOTO-LITHO. SPRAGUE & Co. 28, MARTINS LANE, CANNON ST. LONDON, E.C.

INK-PHOTO. SPRAGUE & Co. LONDON.

ST. ANNE AND THE BLESSED VIRGIN.

DESIGN FOR STAINED GLASS BY MR. E. BURNE' JONES, A.R.A.

The Phototype Co., 308 Strand, London.

DESIGN SUBMITTED IN COMPETITION FOR THE AMSTERDAM

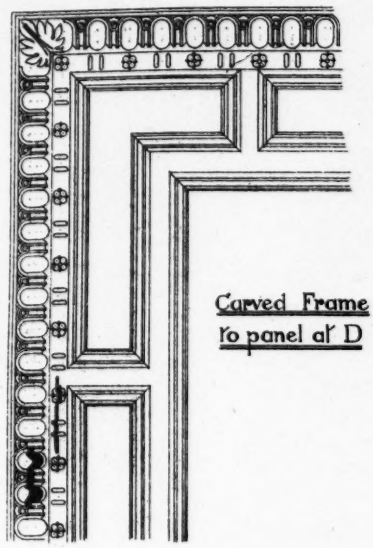
M XCHANGE. MESSRS. POTTS, SULMAN, & HENNINGS, ARCHITECTS.

"INK-PHOTO." SPRAGUE & Cº. LONDON.

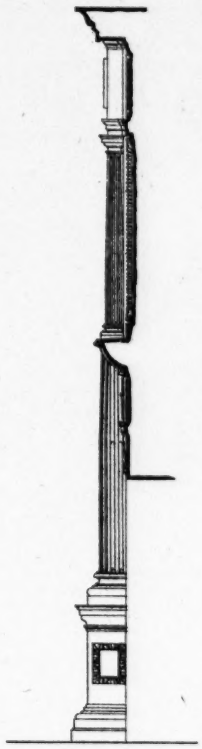
THE SACRIFICE OF ISAAC.

DESIGN FOR STAINED GLASS BY MR. E. BURNE JONES, A.R.A.

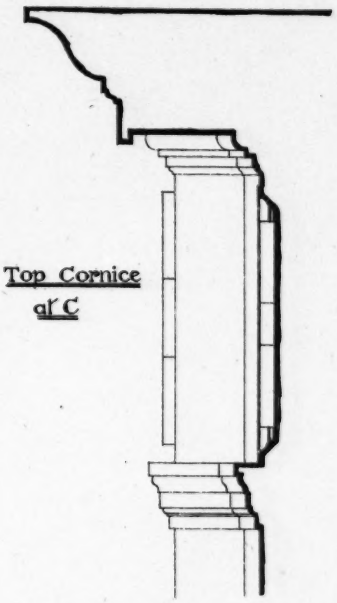
JACOBEAN · CHIMNEY-PIECE · IN · HOLDENBY · HOUSE



Carved Frame to panel at D



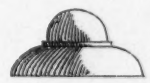
Section



Top Cornice at C

½ full size

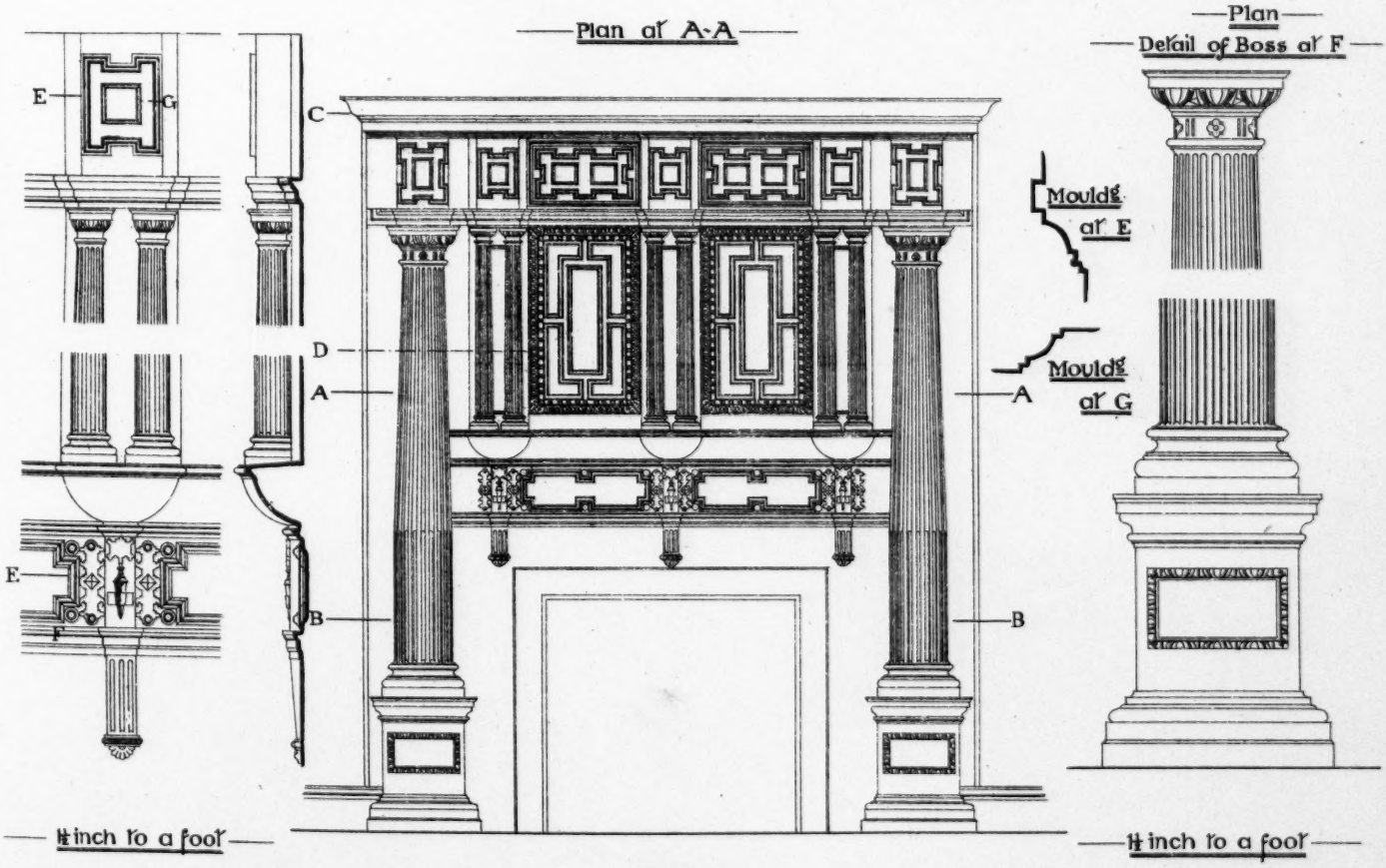
½ full size



Elevation

Plan

Plan at A-A



Mould at E

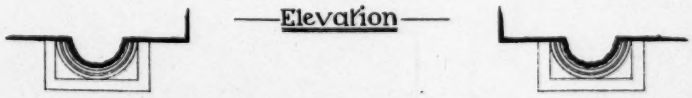
Mould at G

Detail of Boss at F

1½ inch to a foot

1½ inch to a foot

Elevation



Plan at BB

Scale of feet

PHOTO-LITHO, SPRAGUE & Co 22, MARTINS LANE, CANNON ST, LONDON, E.C.

PHOTO-LITHO., SPRAGUE & Co 22, MARTINS LANE, CANNON ST., LONDON, E.C.

DESIGN FOR RESIDENCE NEAR BRIGHTON.—Mr. G. H. Webb, A.R.I.B.A., Architect.

THE AMALGAMATED SOCIETY OF CARPENTERS AND JOINERS.

THE "Twenty-eighth Annual Report of the Amalgamated Society of Carpenters and Joiners," covering the year from December, 1886, to December, 1887, has just been issued. It occupies nearly 400 pages of large octavo size, and includes the financial reports of the branches, income and expenditure at the general office, the number of members, number admitted and excluded, an abstract statement of accounts, net income and expenditure, and legal expenses fund; also addresses of branches, officers, and nights of meeting. The general secretary, Mr. James S. Murchie, in his prefatory remarks, observes that the accounts for 1887 do not present a too-cheerful retrospect, although there are some things upon which he says the members can sincerely congratulate themselves, as compared with the circumstances of some previous years. The unemployed benefit, which is a fairly correct indicator of the state of trade during the year under review, took a substantial turn in the right direction, being 6s. 11d. per member less than in 1886, and which, notwithstanding an increased membership, presents a total reduction of nearly 8,000*l*. There is room, however, for a much larger reduction in this item before the Society could regard the building trade as having returned to a satisfactory condition. During the year the Society has opened eleven new branches; five of these are in England, one in Scotland, four in the United States, and one in Australia. On the other hand, six branches have been closed and two amalgamated into one, leaving a net gain of four branches during the year. The total number of branches at the date of the report was 452, distributed as follows:—342 in England, 21 in Ireland, 17 in Scotland, 29 in the United States, 6 in Canada, 8 in New Zealand, 29 in Australia, and 3 in South Africa. During the year 2,668 members were admitted, which, after allowing for exclusions and deaths, leaves a total membership of 25,497, showing an increase on the year of 518 members. The net income for the year was 67,819*l*. 11s. 8d., and the net expenditure 74,538*l*. 18s. 1½d. Each of these amounts has diminished, the former mainly in consequence of a much smaller levy being called for than in the previous year, and the latter chiefly on account of the reduction in unemployed benefit, previously alluded to. The cash balance stands at 33,667*l*. 17s. 7½d., which, added to the buildings and other property of the Society, makes a total worth of 39,927*l*. 2s. 7½., or 1*l*. 11s. 3¾d. per member,—a loss on the year of 6,798*l*. 3s. 9½d. The total arrears owing by members is 5,434*l*. 17s. 9½d., or 4s. 3d. per head,—a much smaller sum than last year. Unemployed benefit cost 32,814*l*. 17s. 7d., or 1*l*. 5s. 8¾d. per member. Sick benefit required 17,228*l*. 7s. 6½d., or 13s. 6d. per member, and 5¾d. per member less than in 1886. It is pointed out that this item rises and falls with the state of trade. Tool benefit has also been less than in 1886, the amount expended under this head being 1,510*l*. 18s. 7d. This, however, is naturally a fluctuating benefit. Accident benefit, which provides a lump sum to a member whenever he meets with an accident resulting in permanent partial or total disablement, costs 1,370*l*. This benefit exhibits a considerable and continuous reduction, which Mr. Murchie does "not hesitate to attribute to the beneficial operation of the Employers' Liability Act of 1880." Superannuation benefit has increased to 3,797*l*., being 707*l*. more than in 1836. The next item, "trade privileges," has also largely increased, but Mr. Murchie thinks that few members will regret this, "seeing that the money was chiefly spent in resisting an attack on wages by the Birmingham employers." The resistance was successful. The only other dispute of importance during the year occurred at Toronto, Canada, where the men sought an increase of wages, but failed in their object, largely owing, it is stated, to the influx of non-society emigrants, who accepted conditions which the Society men declined. The amount spent under the head of "trade privileges" during the year was 4,487*l*., or 3s. 6¼d. per member. The Society expended for funerals 2,951*l*. 13s. 6d., and for railway fares in sending members to situations, 221*l*. 4s. 5¼d. The sum of 713*l*. was granted by the Executive Council and District Committees from the contingent and benevolent fund in cases of exceptional distress, and 73*l*. was granted from the same fund for the assistance of other trades engaged in disputes. It appears from a table contained on pp. 16 and 17 of the report that the total amount paid by the Society in the chief benefits since its inception in 1860 has been 702,136*l*., on an average membership of 13,112. Over half a million of this sum has been paid to the sick and unemployed alone. The Employers' Liability Act Legal Expenses Fund (England) has a balance in its favour of 1,679*l*. 18s. 3½d. Mr. Murchie, in concluding his remarks, argues that the true remedy for distress through want of employment is to be found in a reduction of the hours of labour and the abolition of all systematic overtime and of piecework where practicable. All this, he says, could be speedily accomplished if working men were but united and true to each other. He looks "with considerable misgivings on the evidently growing feeling in favour of State interference with the hours of labour," and thinks "that it will be a sorry day for workmen when they begin to neglect their unions and to look for relief to wealthy and interested party politicians."

ANOMALIES AND DIFFICULTIES IN THE WORK OF A SANITARY INSPECTOR.

THE paper read before the Association of Public Sanitary Inspectors at the April meeting, held on Saturday last at the Westminster Town-hall, was by Mr. C. J. Easton, of Tottenham, and had for its subject "Anomalies and Difficulties in the Work of a Sanitary Inspector." Mr. Alexander (Shoreditch), Chairman of the Council, presided, and there was a large attendance of members.

Mr. Easton said that among the anomalies of the position of a sanitary inspector was the surprising range and variety of duties which that officer was called upon to perform under the modern conditions of society and in order to satisfy the requirements of modern sanitary science, conditions and requirements undreamed of in the last century, when the protection of the public health was left entirely in the hands of the "parish beadle." The inspector must not only have a fairly good general education, and possess tact, zeal, and energy, but he must be something of a chemist, a doctor, a clerk, a builder, and a plumber (in fact, a veritable "Jack of all trades"), but he must also have a good share of the spirit of the schoolmaster and the missionary. He could,—he must,—do more for his district by the education of the inhabitants in the elementary principles of sanitation than by the rigid exercise of his official authority. He was occasionally hampered by the very men who appointed him, and was sometimes hindered by the medical officer of health. His greatest trouble was with a class of officers who ought properly to be coadjutors and co-operators, namely, the building inspectors and other similar officers, whose duty it formerly was to supervise the erection and drainage of houses. He had himself last year found defective joints in the drains of 134 out of 211 houses which he had tested. It was an anomaly to find that officers requiring to possess so many qualifications should frequently be receiving little more than the pay of an artisan. The undefined position and the powerlessness in some most important respects in which he was left by the Acts under which he acted were among the worst anomalies of his position. In some respects, said the lecturer, the Acts were very ambiguous, especially as to service of notice on the persons responsible for the abatement of nuisances, and so the inspector was often placed in an awkward position as to whom to look for the carrying out of the necessary works. For instance, section 120 of the Public Health Act said that, "Where any Local Authority are of opinion that the cleansing and disinfecting of any house would tend to prevent or check infectious disease, it shall be the duty of such Authority to give notice in writing to the *owner or occupier*." Now, who was to judge as to the responsibility in these cases? The responsibility ought to be plainly fixed by the statutes, and the status of the Inspector should be improved and his powers be augmented and clearly defined. It was to be regretted that the alterations proposed to be effected by the new Local Government Bill did not materially affect the anomalous position of the Sanitary Inspector, and, in the opinion of the lecturer, persistent agitation for the reforms they required must be continued. Inspectors were every day fighting foes much more deadly, because unseen, than any foreign host. Yet should they be striken down in the execution of their duty, or carry pestilence into their homes, there was no monetary recompense. Circumstances demanded that they should live up to their meagre salaries, and after they had devoted the best part of their lives, perhaps, to the interest of the public, there was no fund from which they might receive a solace in their old age, and they were allowed to go down to their graves "unwept, unhonoured, and unsung."

In the discussion which followed the Chairman (Mr. Alexander), the ex-Chairman (Mr. Jerram, C.E.), the Secretary (Mr. S. C. Legg), and Messrs. Rumball (New Barnet), Stace (Limehouse), Woonton (St. George's East), Dee (Clapham), Smith (Hounslow), and Richards (Battersea), took part, and the usual vote of thanks was accorded.

Mr. Abbott (Kensington) subsequently brought forward a proposal to adopt some plan of circulating questions to members on difficult points of practice, with such answers as it might be possible to obtain. Doubtful points of law and anomalies in procedure were constantly confronting the Sanitary Inspector, and it was of the highest importance that some means should be adopted of extending to all the members the knowledge which each of them might have become possessed of in the course of his professional experience.

A resolution calling upon the Council to consider some practical plan for effecting the objects desired by Mr. Abbott was adopted.

ALLEGED NEGLIGENCE BY CONTRACTORS.

WHITE *v.* PETO BROS.

THIS was a case of some importance to persons engaged in building operations in London. It was tried in the Chancery Division of the High Court of Justice, before Mr. Justice Kay, and was brought by the plaintiff, a potato salesman, and the owner in fee simple of a house and shop, No. 10, Russell-street, Covent Garden, adjoining the Hummums Hotel, against Messrs. Peto Bros., the well-known builders, claiming damages for having, in the course of rebuilding the hotel, caused injury to his house by cracking and displacing the wall, and also an injunction. On the matter coming before Mr. Justice Grantham, as Vacation Judge, on the 13th of October last, on motion for injunction, an inquiry as to damage was directed to be taken before a special referee, the result of which was that the referee assessed the structural damage done at 40*l*., but without prejudice to any question of liability. The pleadings were subsequently delivered, the defendants alleging in their defence that the works had been executed under the provisions of the Metropolitan Building Act, and that the damage, if any, to the plaintiff's premises was "a necessary consequence of carrying out the said works," and that the plaintiff's remedy, if any, was only against the building owner by whom they, the defendants, were employed. The action now came on for trial. The principal damage complained of was the sinking and cracking of the south wall of the plaintiff's house, caused by the defendants' operations in underpinning the wall. There appeared to be some question whether the wall was a "party-wall" within the meaning of the Metropolitan Building Act, it being said that the plaintiff's wall and the old wall of the hotel were really independent structures, though immediately contiguous to one another.

Mr. Justice Kay said that in this case the action was brought by the owner of No. 10, Russell-street, Covent-garden, against the defendants, Messrs. Peto Brothers, the well-known and very eminent builders, for damage done to his house by their operations as builders in pulling down the Hummums Hotel and building on its site, at the corner of Russell-street, a much larger and loftier hotel under the same name. The plaintiff's complaint was that these operations had caused damage to his house. The defendants said "*Respondeat superior;* we did this under the Metropolitan Building Act; we are contractors, and what has happened is the necessary consequence of what we did under the Act." The first question was, was this work negligently done, or was the damage the necessary consequence of what the contractors did? Upon the facts as proved before him it appeared that the plaintiff's house had been cracked from top to bottom. There were cracks in the south wall which went to the top of the house, and they were admittedly caused by the acts of the contractors, which his Lordship was assuming were acts authorised by the Metropolitan Building Act. Having given to the then occupier of the plaintiff's house the notices required by the Act, the work which they did, so far as the plaintiff's house was concerned, was this. They dug out the foundations of the Hummums Hotel 9 ft. lower than they were before, and they dug 9 ft. lower

than the foundations of the plaintiff's house, and in doing so they underpinned the plaintiff's house. It was said that, although this underpinning, which was of every-day occurrence in building operations in London, was done by such an eminent firm as Peto Brothers, yet it was a necessary consequence that damage should be caused to such an extent that the plaintiff's house was cracked from top to bottom. If all the builders in London came and said that was a necessary consequence of underpinning, his Lordship would not believe them. Nothing was more common than underpinning a house in London, and his Lordship had himself seen it done without the house being let down the slightest fraction of an inch. On the evidence before him he was satisfied that there had been negligence, and very considerable negligence, in the way in which this work had been carried out. The law applicable to the case was stated in that well-known work, "Addison on Torts," 5th edition, p. 671, as follows:—

"If an action is brought against contractors and workmen who are personally engaged in the execution of public works under the order or authority of trustees, or a board of public works, and the damage of which the plaintiff complains is the inevitable result of the execution of a public work under statutory authority, the action will fail; but if the damage arises from the negligent execution of the work, and might have been avoided by the exercise of proper skill and care, the contractors and workmen will be personally answerable for the damage done."

The authority cited for that was "Jones *v.* Bird" (5 "B. and Ald.," 837), which fully supported that statement of the law. It had been admitted in the course of the argument that if this damage was not the necessary consequence of what the contractors had done they were liable. Now they had not called a single witness to prove that it was a necessary consequence. If his Lordship came to the conclusion that it was not a necessary consequence, but that the damage arose from the negligent execution of the work, then the maxim *respondeat superior* did not apply, and the defendants, the contractors, were liable. But this wall was not a party-wall. Two of the plaintiff's witnesses had proved distinctly that it was not a party-wall, and they were not cross-examined on this point. His Lordship had been asked, after the conclusion of the arguments, to allow fresh witnesses to be called to prove it was not a party wall; but to allow that to be done after argument would not conduce to the ends of justice. If this was not a party wall, the defendants had no authority under the Metropolitan Building Act to underpin at all. It was to this underpinning that these cracks on the south wall were to be referred. The Metropolitan Building Act was not a defence to the action, and did not exonerate the defendants. The question of structural damage had been referred to a special referee, who had reported that 40*l.* represented the damage done to the plaintiff's house. Under the circumstances his lordship assessed the damages occasioned to the plaintiff at 50*l.*, which sum, together with the 40*l.* awarded by the referee, must be paid by the defendants, who must also pay the costs of the action.—*Times.*

"THE WORK OF ALFRED STEVENS IN LIVERPOOL."

SIR,—I must leave Mr. Goodchild and Messrs. Gamble, Stannus, & Townroe to settle between them the question of the truth of their opposing statements as to the pediment sculpture of St. George's Hall. There is one point, however, with regard to the last paragraph of Mr. Goodchild's letter [p. 252, *ante*], about which I should like to ask him a question. He rightly says (as also was stated in my article, p. 223, *ante*) that the sepia drawing of the pediment sculpture was the one exhibited at the Academy. Now this represents the sculpture adapted to the actual pediment of St. George's Hall. But it has been asserted by others that Elmes first saw Cockerell's design for the sculpture at the Academy, that he recommended it to the Liverpool authorities as suitable for St. George's Hall, and that then Professor Cockerell was applied to to make the necessary changes in it. This account always seemed improbable to me, but Mr. Goodchild can very likely throw some light on the question.

As to the pavement, Mr. Goodchild is wrong in assuming that the pencil sketches have anything to do with an enlargement. They are the sketches of the man who designed the figures, and we can trace in them the growth of the design for each figure. What I have stated about them in my article is absolutely correct. There is no doubt at all of their being the work of Stevens. The second pavement drawing at Liverpool, I forgot to say, is clearly not Stevens's, any more than the first. Perhaps Stevens was only concerned with the figures. Those upon the coloured design are miserably drawn.

W. M. CONWAY.

University College, Liverpool.

SIR,—I do not wish to re-open in your columns the long controversy I have had with Professor Conway in the *Liverpool Daily Post*, but through accidental circumstances I have only just seen the *Builder* of March 31, and find there one or two points which call for comment.

Mr. Goodchild has corrected Mr. Conway's erroneous impression as to his means of information on all Professor Cockerell's work of the date referred to: how could Mr. Cockerell deny the claim put forth on behalf of Stevens after Stevens's death, and long after his own decease?

With regard to the work attributed to Stevens, namely, the four figures at the base of the pediment, as I have told Professor Conway, if the original claim had been confined to them I do not know that I should have deemed it worth notice: they are so very subordinate and insignificant. But I think the fact should be known that some one presented to the Art Gallery of Liverpool a copy of the Stevens lithograph without the lettering the finished prints bear; and attached to the frame was a label setting forth that the whole sculpture was designed, and partly executed, by Stevens! Now the claim has dwindled down to his having modelled the four figures in the angles at the base! Similar figures are proposed in Mr. Cockerell's sketch, and Stevens seems to have suggested a modified treatment; but on comparing the lithograph with a photograph of the south end of St. George's Hall it will be seen that the sculpture as executed varies very materially from the lithograph. In the four figures ascribed to Stevens, Cockerell or Nicholl has refined the coarseness which seems inseparable from all Stevens's work, whilst the alterations in other parts show that even after Stevens had finished his drawing the grouping has been carefully revised, no doubt by Cockerell. The photograph also discloses the very imperfect perspective and foreshortening of the lithograph, so that, clever artist as he was, Stevens, like many other clever artists, had defective appreciation of visual effect; whilst, on turning to the original sketch, it will be seen that, without having the actual figures before him, as Stevens had, Cockerell's perspective is much more accurate.

Professor Conway says: "The opponents of Stevens's claim do not adduce any arguments against it"; to which I reply that, with the assistance of Sir R. Rawlinson and Mr. Goodchild, I have adduced not only arguments, but also facts, which are much more awkward customers.

It may be as well, for the sake of accuracy, to mention that Cockerell was not the immediate successor of Elmes in the work of St. George's Hall.

In compliance with the request of Elmes, Sir R. Rawlinson undertook the charge until his removal to London on his appointment to the Board of Health, now the Local Government Board. St. George's Hall then fell to the care of the then Borough Surveyor, Mr. Weightman; finally, Mr. Cockerell was called in, specially for the Great Hall.

I am surprised Mr. Conway should speak so disparagingly of the drawing exhibited in the Royal Academy in 1843, and subsequently in Paris, being the first attempt to develope Mr. Cockerell's sketch. According to my experience, it has been much admired by very competent judges.

JOSEPH BOULT.

Liverpool, 10th April.

*** We do not think anything will be gained by further discussion of this subject at present. We may be allowed, perhaps, to state our own conclusion that Professor Conway has claimed rather more for Stevens, in regard to the sculpture, than the available evidence seems to bear out, while we cannot but express our surprise at the attribution of "coarseness" to Stevens's work, unless Mr. Boult regards massiveness and breadth of style as "coarseness."—ED.

The Old Sussex Hotel, St. Leonard's-on-Sea, is now being partially rebuilt, with extensive alterations and additions. The architects for the work are Messrs. Elworthy & Son.

ARBITRATION IN PORTUGAL.

SIR,—The delays of the law in Portugal seem greater than in any other European State, judging from the following facts:—

In the year 1861, the Lisbon Water Company entered into a contract with a firm of contractors, French and English, for the canalisation of Lisbon, and other works. The contract contained the usual clause, that in case of disputes arising, they were to be referred to arbitration. In 1863 disputes did arise and the reference took place.

The arbitrators gave their award in 1865, and on all points in favour of the contractors, specially stating that the Water Company had no right to detain the 20 per cent. retention, which, was at once to be paid with "commercial interest" up to date of payment.

A reference being the only course permitted to the contractors to obtain payment, the Water Company were allowed on all and every point to appeal, and were always defeated. This they continued to do from the date of the award (1865) until 1885.

The award then passed to the Judge Liquidateur (equivalent to our Chief Clerk) to work out the final decree. This official took about two years to do so, giving his decree in 1885. He followed, of course, the articles of the arbitrators' award, giving interest on the Retention at six per cent. (the arbitrators' commercial interest) from May, 1863 to September, 1877. At last the end of this litigation seemed in sight; but not yet, as the Water Company were again allowed to appeal, on the ground that nothing was said as to payment of the principal sum retained. Interest could be paid, but not the amount of the retention, though the arbitrators clearly stated (twenty years previously) that all delays and errors were on the side of the Water Company, and therefore ordered payment of all due to the contractors, with commercial interest until paid. As putting the award of the arbitrators above suspicion it may be added that the Judges on one occasion, when dismissing an appeal of the Water Company, said, "The arbitrators and umpire being five of the most worthy of the nation, we are bound to respect their judgment and award."

AGUA.

FITTINGS FOR HOT-WATER SUPPLY.

SIR,—I know of no special work on the above, although there are several on heating by hot water. I am, however, very happy to supply some *very general* information for your correspondents. No building is particularised by them, I must therefore imagine one,—say, a large block of residential chambers, with obligation on the part of the proprietor to supply hot water *ad lib.*

The boiler should be placed in the basement, and as much below the floor as may be, as the greater the distance through which water flows on its return to the boiler, so will be its effective action due to unequal pressure on the return pipe, the specific gravity of the water in which is much greater than that in the boiler. An open cistern of proportionate size should be fixed at the highest elevation, and from the boiler to this cistern a flow-pipe should be carried direct, and a return-pipe, and a cold-water cistern placed near as a supply connected with a bent pipe, as shown. The supply must be regulated so as to allow for expansion, as water when heated to 212° expands 1-24th of its bulk; it may, however, be within the limit of safety to provide for 1-30th of the whole contents of the apparatus, as the water may not reach a temperature of 212°, and if it does, the expansion of the iron will give increased capacity. The bent pipe to the cold-water cistern will counteract any eccentricity of action, or escape of any heat or vapour at that point, as part of the legs of the syphon will always remain cold. Valves of the best manufacture may be placed at convenient points of the flow-pipe for drawing water, and if these have screw nozzles, flexible hoses may be fixed and carried to bath-rooms. Underhay, of Crawford-passage, Clerkenwell, may be depended on for supplying good valves.

Care should be taken to fix no parts of the piping level, otherwise circulation will cease.*

Great care is necessary in fixing and laying the pipes that contraction and expansion may be provided for, as the expansive power of iron when heated is so great that nothing will withstand it. The linear expansion of iron between 30° and 212° equals 1⅝ in. in 100 ft.; therefore the pipes should be arranged for free expansion. Where the lengths are considerable, I provide expansion boxes; and where they incline to the horizontal, I have them

* It is, perhaps, rather overstating the case to say that circulation will "cease," but it will be materially checked. ED.

laid on rollers, as contraction in cooling equals expansion in heating. Where pipes lie in trenches, there is frequently great loss of heat by radiation; it will, therefore, be well to coat the flow-pipes with Leroy's composition, leaving the return-pipes bare, that their more rapid cooling may promote activity of circulation.

If there is risk of freezing when fires are out, it may be well to coat the whole. Every boiler should have a safety-valve: accidents by explosion of kitchen boilers would be avoided if this precaution were observed.

Where pipes are likely to freeze, the taps attached should be kept weeping day and night, just sufficient to maintain the centre of the column of water in a liquid state, which will allow of expansion in freezing, and protect the pipes from cracking.

Overflow-pipes should be provided from hot-water tanks, or from circulating pipes, to discharge on to roofs. If the overflow pipe is led into an eaves gutter, it will saturate the adjacent wall, and constitute itself a nuisance. If the roof is tiled or slated, a small lead apron, arranged presentably, should be fixed to receive the overflow, which discharges at times with great force.*

Some waters contain earthy salts, carbonates, sulphates, and nitrates. These saline matters deposit in the boiler, and less heat is received by the water consequent upon this interposed substance, which not only encrusts the boilers, but chokes the pipes. A solution of muriatic acid, in the proportion of 30 to 1, will reduce the concreted sediment in boilers, and facilitate cleaning, but hard water is a troublesome factor to reckon with. Clark's and the Porter-Clark systems will eliminate very much of the earthy salts. The office is at No. 165, Queen Victoria-street, E.C.

Where there are steam boilers I use super-heaters for cooking, washing, baths, and supplying hot water. The following summary may enable the plan to be understood. The heaters resemble boilers, have ¾-in. steam tubes in them through which the steam circulates; the water being outside the tubes is led by tubes to wherever it is wanted with a flow and return to each group of services. Supply cisterns and ball-cocks are requisite, and where large quantities of water are required a reserve cylinder should be provided, and where very small quantities at irregular times are required a steam-pipe should be led directly to a small iron tank to heat the water. I recommend Lloyd's tubes, best lap welded with screwed ends, bends, junctions, and expansion joints, tested to 250 lb. to the square inch. Messrs. Bailey, Pegg, & Co.'s patent pipes are the best for heating buildings with hot water, they are fixed so simply. Messrs. T. Waller & Co., of Fish-street Hill, E.C., carry out my plans very well.

The foregoing precedents of practice may probably be of some service to your correspondents.

T. E. Knightley.

THE CANDLE BEAM.

Sir,—Will you kindly permit me, through your columns, to ask if any of your readers can give me any information respecting the Mediæval candle-beam?

We know that the candle-beam had its origin in the baldachino or ciborium, which was a canopy supported on four columns. When the baldachino disappeared, as it did at the close of the eleventh century, two of its columns were retained to support a beam on which were placed those candles which up to this time had had their place on the canopy. To these candles were subsequently added, at different periods, figures, reliquaries, and a crucifix.

Up to the time of the disappearance of the baldachino as a whole, the dove or pyx for the Host had been suspended from the canopy. Now we hear the dove always spoken of as having been suspended from the roof. Why should it always have been suspended from the great height of the roof, when a beam (the candle-beam) eminently suitable for the purpose was at hand? We know the dove to have hung from the roof of the baldachino up to the end of the eleventh century, and also as occupying in the tabernacle on the altar from the commencement of the sixteenth century, a position at the back of the altar similar to that which we may reasonably suppose it to have occupied had it been suspended from the candle beam; consequently, may we not suppose that when spoken of as suspended from the roof, the allusion is not always to the roof of the church, but to the candle-beam, which was, in truth, part of the roof or canopy of the early baldachino?

Now, respecting the support of the candle-beam: What was the usual length of the beam? Was it of a length corresponding to the altar, and supported on two columns alone; or of a greater length, and stretching across the whole width of the chancel? Did it find a supporting bracket for each end in each wall?

The only evidence, to my knowledge, in support of the latter view is at South Hayling, where, in the chancel, we find two brackets (First Pointed) opposite to each other in the north and south walls respectively, placed several feet from the east end, and several feet above the level of the floor, each from its unusual and peculiar form of construction evidently intended to receive and support the end of a beam; but if intended to support the candle-beam, how is it that the inner faces of our chancel walls do not more frequently bear traces of such brackets; and if not so intended, for what purpose were they constructed, and in what way was the candle-beam supported?

Henry Littlehales.

Clovelly, Bexley Heath.

* With London water it is essential to carry the overflow or safety pipe *vertically* up to and through the roof; horizontal lengths are liable to become choked with deposit in course of time, and the water and steam be confined in the circulating system, with possibly dangerous results.—Ed.

HYDRAULIC LIFTS.

Sir,—Permit us to correct an error which has crept into your description of our "Reliance" lift [p. 232, *ante*]. The three suspending ropes are conducted to the centre of the top of the cage, so that either one will alone suspend the cage in its proper travelling position; consequently, the breakage of any one or more ropes will have no tendency to tilt the cage over sideways. We would take the opportunity of emphasising the point that the "Reliance" gear gives warning when a rope is stretching, and before actual fracture, instead of waiting till the accident has occurred.

Archd. Smith & Stevens.

THE LATE MR. NESFIELD.

Sir,—In your obituary notice in last week's issue [p. 244] you state that the late Mr. W. Eden Nesfield went abroad as Travelling Student of the Royal Academy. Mr. Nesfield was never a student of the Royal Academy; he travelled, therefore, on his own resources.

R. Phené Spiers.

Sir,—May I be permitted to say a few words by way of addition to the obituary notice of Mr. Nesfield in your issue of last Saturday?

Mr. Nesfield's record is a very simple one. He entered Mr. Burn's office in 1851, but not taking kindly to the sort of work in vogue there he left in 1853, when he went to Mr. Salvin's office, where he remained till 1856, afterwards going down to Keele Hall in Staffordshire,—a large house Mr. Salvin was then building,—to be under the clerk of works. He went abroad in 1857 and again in 1858 or 1859, making a great number of most valuable sketches and measured drawings, some of which were afterwards published in his well-known book.

With his friend, Mr. Norman Shaw, he went to the old office in Argyll-street in 1863, and stayed there till the end of 1876, but the so-called partnership was purely nominal. They never paid any attention to each other's works, and never did a joint work,—in fact, they "shared offices" rather,—and so it is not surprising that at the end of three years or so the "partnership was quietly dropped." Their assistants were the only people who profited by the arrangement, as they had the unique advantage of studying under two such consummate masters of their art, an advantage I feel certain was most highly valued by more than one.

Mr. Nesfield was an Associate of the Institute from 1861 to 1868 or 1869, when he resigned. He never made speeches or wrote papers, and, though he often made perspectives of his works, few were ever published. Of his more important works, Cloverly Hall is perhaps the best known; but almost more important still is the great house in Kinmel Park, in North Wales. This mansion,—a small Hampton Court in its way,—was designed twenty years ago, in the English Classic, or so-called "Queen Anne," style. I am not aware it has ever been published, and it seems to be so little known as not even to be mentioned among his works by the writer of the notice on Saturday. Yet it is quite without a rival in the style, for the artistic power and knowledge it displays, for the dignity of its treatment and the refinement of its detail. Like all he did, it is the work of a true artist, and carried out with a thoroughness and vigour which were all his own.

J. M. Brydon.

Memorial Clock at Upper Tooting.—A clock and bell has been fitted in the tower of Trinity Church, Upper Tooting. The work is by Mr. Benson. The escapement is a Graham's dead-beat of the highest finish. It shows the time upon a skeleton dial 5 ft. diameter with ornamental centre, the back of the figures being glazed with opal glass, and the figures and hands painted blue with gilt centre and bands. The hours are struck on a bell of 3 cwt.

The Effects of the Late Mr. George Godwin.—Reverting to a paragraph in last week's issue of the *Builder*, we are asked to mention that the architectural and other books will be sold on Wednesday, April 18th; the chairs and valuable antiquities on Thursday, April 19th; and the bronzes and household effects on Friday, April 20th.

The Student's Column.

IRON.

XV.—COMPARATIVE MERITS OF GIRDERS SUPPORTED AND FIXED IN DIFFERENT WAYS AND SUBJECT TO A UNIFORM LOAD.

In the case we are now considering the greatest shear as well as the greatest bending moment both act at the wall A, fig. 5, the

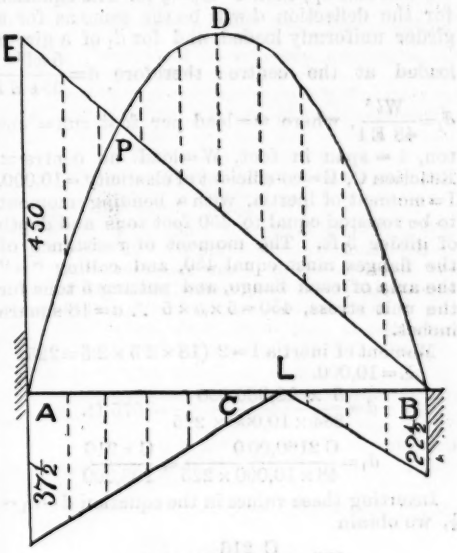


Fig. 5.

shearing stress at A being 37½ tons and at B 22½ tons. Lines drawn from point L (which bisects the horizontal distance between B and P) to lines representing the shear at the abutments platted downwards at A and B, form triangles the ordinates of which will give the shearing stress at various points along the girder. The point of contraflexure is situated in the girder vertically under the intersection of the line E B with the curve A D B, and is marked P in fig. 5.

We now come to the case of a continuous girder of two equal spans, which is identical in reasoning with the condition of two girders, each being considered fixed at one end and free at the other, as in fig. 4, article xiv. If it is decided to put up a column at the centre of the span of 60 ft. we can find the additional strength gained thereby in the following manner. The moment in this case is greatest over the column, and equal to $\frac{30 \times 30}{8} = 112\frac{1}{2}$ foot tons = ¼ of that shown in fig. 2. This shows that four times the load, or 240 tons, could be safely carried by the flanges between A and B. The bending moments are shown in fig. 6, the parabolas representing the bending moment on each span considered as independent girders, and the height C R the bending moment of 112½ tons acting at the pier, and the ordinates between the parabolas and the straight lines the bending moments at various points. We may here observe that for girders of uniform section the continuous girder of two equal spans and uniformly loaded possesses no advantage over two independent girders resting upon the central column, provided the supports are all on a level. We have now seen that a girder designed to carry a uniform load, and supported at the ends (fig. 2), has its efficiency increased four-fold, theoretically, by the insertion of a column (fig. 6) at

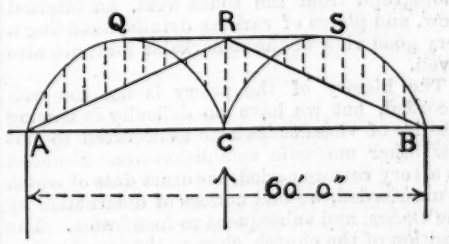


Fig. 6.

the centre of the span, but it must be remembered that in practice it will often happen that an existing girder cannot be raised to enable a column to be placed in position; for instance, if the weight upon the girder is a wall, the column does not bear the weight it would have had to sustain if it had been erected in the first

place with all the supports on a level, since there would exist a permanent set in the girder. The effect of this would be to considerably alter the reactions at the three supports, and, therefore, the bending moments. As an example, let us suppose the column at the centre is ½ in. lower than the two end supports. The natural deflection of the girder, considering it to be supported at the ends A and B, = d; but there is an opposition to this deflection, due to the upward pressure of the column C, which we will call d_1; then $d - d_1 = \frac{1}{2}$ in. The equation for the deflection d will be the same as for a girder uniformly loaded, and for d_1 of a girder loaded at the centre: therefore $d = \frac{5\,wl^4}{384\,E\,I}$

$d_1 = \frac{Wl^3}{48\,E\,I}$, where w = load per foot run = one ton, l = span in feet, W = load at centre = Reaction C, E = co-efficient of elasticity = 10,000, I = moment of inertia, with a bending moment to be resisted equal to 450 foot tons and depth of girder 5 ft. The moment of resistance of the flanges must equal 450, and calling "a" the area of each flange, and putting 5 tons for the unit stress, $450 = 5 \times a \times 5$ $\therefore a = 18$ square inches.

Moment of inertia $I = 2\ (18 \times 2{\cdot}5 \times 2{\cdot}5 = 225$.

E = 10,000.

$$d = \frac{5 \times 12{,}960{,}000}{384 \times 10{,}000 \times 225} = {\cdot}075 \text{ ft.}$$

$$d_1 = \frac{C\,2160{,}000}{48 \times 10{,}000 \times 225} = \frac{C \times 216}{108{,}000}$$

Inserting these values in the equation $d - d_1 = \frac{1}{2}$, we obtain

$$ {\cdot}075 - \frac{C\ 216}{108{,}000} = {\cdot}0417 \text{ ft.}$$

$$C = \frac{({\cdot}0417 - {\cdot}075)\,108{,}000}{216} = 16{\cdot}65 \text{ tons.}$$

$$A = B = \frac{60 - 16{\cdot}65}{2} = 21{\cdot}67 \text{ tons.}$$

Moment at C = $(21{\cdot}67 \times 30) - (30 \times 15)$ = 200 foot tons.

Books.

Deerhurst, a Parish in the Vale of Gloucester. By the Rev. GEO. BUTTERWORTH. Tewkesbury: Wm. North. London: Simpkin, Marshall, & Co. Small 8vo.

IN this little volume of 180 readable pages the worthy Vicar of Deerhurst has given to the world a charming record of all that is known of the parish, and of the many objects of interest which it contains. For thirty years, the writer tells us, he has resided in the place as friend and teacher of its people, and his attempt, as he modestly calls it, has been, with an eye fixed on a single spot, to collect particulars of all kinds relating to it. There are notices of family history, folk lore, and legends, particularly one of a local dragon, records of floods, the presence of strange birds, and many such. Nor are the botany and the geology of the district forgotten.

The ancient priory church, the principal but not the only architectural monument of the parish, is the special object for which Deerhurst is most famous; and since the building is even yet not so well known as it should be, any remarks that may tend to throw light upon it must be welcome to architectural students. The book before us contains a ground-plan of the church as it is supposed to have been in Saxon days,—for we have to deal here with one of the best preserved and one of the largest of our Saxon churches. A plan of the building as it exists at present, a little photograph from the south-west, an internal view, and plates of various details, including a very good view of the remarkable font, are also given.

The history of the priory is not too well recorded, but we have no difficulty in tracing a series of vicissitudes such as occurred to but few other monastic establishments. Founded at a very remote period, the exact date of which is unrecorded, we find notices of destruction by the Danes, and subsequent re-foundation. The position of the church, close to the broad waterway of the Severn, so convenient for the passage of a foe, would render attack upon it easy enough. We find it, notwithstanding, well and munificently endowed at the middle of the eleventh century, although by then, according to our author, it appears to have lost the Manor of Deerhurst, the boundary of which comes close up to the church. Its possessions at the time named were befitting a community of importance. Then an event occurs, of no small moment to the fortunes of the establishment. It was given by King Edward the Confessor to the Abbey of St. Denis, Paris. No explanation of the act is rendered, but the consequences appear to have been fatal to its after-growth. William of Malmesbury describes it, about 1150, as "an empty monument of antiquity." Fire is hinted at by our author as the cause, but this hardly appears a sufficient reason for what we must consider as being a desertion of the site by its occupants. Architectural features of a date not long subsequent to the above, which show that enlargement of the nave was effected by the addition of side aisles, indicate that some sort of re-settlement of monks must have taken place. In 1250, the Abbot of St. Denis sold the priory to Richard, Earl of Cornwall, the Pope countenancing the sale, and the monks were expelled and the buildings destroyed; however, it came into the hands of the abbey again. Being now an alien priory, its seizure would follow as a matter of course with that of similar institutions, in times of foreign war, and we accordingly have some indication that it was taken possession of by Edward III., but certainly by Richard II. in 1380, who retained it for a while, together with all its possessions. These vicissitudes are not without their counterpart in other alien priories; but the close of the monastic rule at Deerhurst is exceptional.

There are, firstly, records which will be read with much interest by every student of English history relative to the denizenship of the priory. Instead of its being suppressed with the other alien houses it obtained the privilege of electing its own prior. The particulars are rendered by a charter of Henry V., the substance of which is given by Mr. W. de Gray Birch from the hitherto unknown document in the British Museum. The business-like details of the court of inquiry, the jury, the recital of the possessions of the priory, and all the notes of procedure in an unusual case, render this document one of no small importance. The priory being made as much English as any other establishment, we are hardly prepared to find that the charter of Henry V. had to be confirmed in the twenty-first year of Henry VI., although the supposition that this was simply for a little extortion in the way of a fee is plausible enough. We are not, however, prepared for what was, for Deerhurst, its final catastrophe, in which its history differs so greatly from that of other similar monasteries. Its denizenship was revoked, and in 1469 it was bestowed upon the neighbouring Abbey of Tewkesbury, of which it continued to be a mere cell with only four monks until the Dissolution.

Bishop Carpenter (1469) speaks of Deerhurst as an ancient foundation utterly ruined through shameful neglect, waste, and through a frequent appointment and expulsion of priors. "Where once were supported a goodly number of persons professing religion, now scarcely a single monk is left."

According to our author, the Saxon church consisted of an aisleless nave, a square chancel, with aisles of two bays each on each side of the chancel, there being traces of a demolished polygonal apse beyond the curious chancel arch. Another more western arch he considers was demolished when a fifteenth-century rood-loft was added, the chancel being monastic, the nave being parochial. At the west end is the peculiar tower familiar to us by the sections in Parker's *Rickman*.

The tower gives access to the church by three arches, one east of the other, thus forming one porch beyond the other, the central wall being carried up so as to divide the tower for a great part of its height into an eastern and a western division,—an arrangement unique in our English church architecture. The blocked chancel arch is somewhat elaborated; but the peculiar feature of the chancel is its curious range of two small openings on each side of the floor level, while above them, alike on each side, is a semicircular doorway. No-floor line is visible between the two ranges, and, indeed, if there were, a floor would have cut the present Saxon chancel arch.

The arrangement points to the presence of an undercroft, or one chancel above another, something such as exists at Wing, and which did exist at Repton; but if so, the chancel arch must be of later insertion. Mr. Butterworth does not suggest this arrangement, but he does hint at the existence of three small loops in the square east wall above the chancel arch, one of which at least would have been blocked by the roof of any apse, had any such existed then. The apse appears to have been removed at an early period, and the arch walled up. The Saxon work is remarkable for the absence of long and short work, pilaster strips, and double-splayed windows. One of the plates gives measured drawings of the remarkable Roman-like fluted pilasters and triangular-headed openings looking from the tower into the church. The font is of very great beauty, covered with delicate involved patterns, of Early Saxon date. Our author very justly lays claim for an early period for the erection of the church, in which we thoroughly concur. It may be added that, we venture to think, a critical examination of the fabric itself will reveal more than one period of Saxon work.

The curious Elizabethan arrangement of the chancel seats which surround the Communion-table is described in the pages before us.

To turn to the newly-discovered Saxon chapel at Deerhurst, recently illustrated in our pages, Mr. Butterworth describes his discovery of this curious relic, which gives his parish the distinguishing feature of the possession of two undoubted Saxon buildings.

The description is illustrated by plans, details, and a pretty photograph showing the north side of the chapels and the picturesque old timber house of Judge Powell, growing on to the east end of the little building. Mr. Butterworth's readings of the two inscriptions, one the dedication of an altar to the Holy Trinity, as it now is proved to be (and not to St. Peter), the other the well-known Odda stone recording the erection of "Regiam aulam"—"in honorem S. Trinitatis," 1056, have already in part been referred to in our pages, and they need not, therefore, be discussed here. His belief that both stones relate to the newly-discovered chapel is doubtless true. He must, however, confine his opinion to the erection of the altar only, and the Court House of the manor, the property of Westminster Abbey, by Earl Odda, in 1056. The chapel will not bear out this late date. It is considerably older. At the date named Edward the Confessor was erecting Westminster Abbey in the Norman style. Elsewhere, at about this time, in England, we find neatly-worked Saxon masonry, showing so many signs of advancement as to prove its lateness of date. We can, in fact, recognise late Saxon work from early. Here, the newly-discovered chapel has no such evidences. It presents well-defined long and short work of early appearance; the windows have double splays, the arrises are unmoulded. What more likely than that the Earl, knowing the intention of his master to bestow the manor on the Royal foundation at Westminster, should build the Abbot's Hall and repair the ancient chapel to afford accommodation to the tenantry, the Manor representing one property, while the Priory Church stood on another?

This view is supported by the inscription, for the Abbot's Hall is more likely to be designated "Royal Hall" than the very moderate-sized chapel, which could hardly be so called.

How to Assess the Value of Land and Property compulsorily taken by Railway and Canal Companies and Corporations. By JOSEPH HENRY MCGOVERN, Fellow of the Liverpool Architectural Society. London: John Heywood. 1888.

THIS little work will no doubt prove a handy volume to many, but at the same time we can see no particular reason for its publication. The greater part of what is told us has been repeated over and over again by other writers, and, therefore, the chief value of a book like this is that it simply increases the general store of works on this subject. A single example will suffice to illustrate our meaning. Mr. McGovern begins his fifth chapter thus:—"If direct access is cut off from property by railway improvements or undertakings, although no land is taken, compensation would lie.—Caledonian Railway Company *v.* Walker's Trustees." This is not new; it is to be found laid down in decisions of greater authority than that here cited, and it has been stated by other writers in clearer and correcter style. The book only contains fifty-nine pages, and we have sufficiently indicated its character to our readers.

The Merchandise Marks Act, 1887, *together with the Order in Council in regard to the Marking of Foreign Watch-cases; also the Customs Regulations in regard to the Importation of Goods bearing Trade or Descriptive Marks.* With Notes by G. D. HAM. London: Effingham Wilson. 1888.

THERE is next to nothing to be said of this little edition of this well-known Act. It is sufficient to say that the arrangement of the commentator is to give a heading consisting of the number of each section, then follow a few lines of introductory explanation, and after this comes the section itself. It is a handy and, we presume, though we have no information as to its price, a cheap edition of this Act.

Practical Guide for Trade Mark Owners, containing Directions for Registration, with Notes of Legal Decisions under the various Acts; a Summary of the Merchandise Marks Law Amendment Act, 1887; *and Information as to Protection of Trade Marks in Foreign Countries and the Colonies.* Edited by H. KERBY, Solicitor, and P. VARNALS, Secretary of the Trade Mark Protection Association. London: 1887.

THIS work is considerably larger than that which we have just noticed. It is primarily intended "to provide the trade-mark owner with such a guide as will enable him to understand the nature and extent of his rights, and the methods by which to secure them." The main divisions of the book are concerned with Registration, Notes of Legal Decisions, the Acts, and Foreign and Colonial Registration. We have had occasion to go through a number of works on this subject, and it is not easy to award any special place to one more than another. The legal notes seem to us perhaps to be the most noticeable feature of this particular work. They are written clearly and concisely. But without referring to the full report of each case in the regular reports, it would be impossible to say if they are all strictly representative of the pith of the judgment. So far as we have ascertained, they are trustworthy notes.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

4,354, Warming Rooms, &c. J. Heginbottom.

This invention relates to a system of hermetically sealed pipes which contain air, heated in a continuation or part of the pipes which is arranged as a coil. Water may be used, or any method of heating adopted, the principal end in view being the systematic and uniform heating of railway carriages.

4,997, Draught Preventer. F. E. Pontifex.

This invention relates to a device which may be fitted to doors or windows. A rod is fitted into a narrow channel cut in the thickness of the door, and by its weight or by the action of springs is forced down to the floor, acting as a draught preventer. The rod also serves to keep the door closed, as a little force must be exerted to open the door or to move it in any position, the weight of the rod tending to keep the door lightly fixed in whatever position is desired.

6,080, Water-closets. J. V. Eves.

This invention consists essentially of a movable or swivelling trap connected to the pan of the w.c., the bend of which is of a height equal to the depth of water required in the pan. By turning the trap to one side or the other the contents of the pan are allowed to flow away down the soil pipe. By this means valves or plugs are dispensed with.

6,346, Roofing and Wall Tiles. A. T. Morse.

The tile which is the subject of this invention is lightened by dispensing with the portions which perform no useful function, and a lock is provided by the peculiar shape. The tile in its most elementary form is that of a square tile (laid cornerwise or diagonally) deprived of its side corners to form lateral abutting shoulders which are turned down so as to interlock.

6,342, Moistening Air. J. Rawlinson.

When it is required that the air in a building be rendered moist or humid, as in cotton mills, &c., series of steam-pipes are arranged, one within the other, and the air is passed through a chamber. The air from the chamber is deflected downwards into a chamber which contains the series of steam pipes or vaporisers. After mingling with the vapour the air is delivered in an upward direction through a grating, or is suitably discharged into the room.

709, Cover for Earth or Water Closets. G. Bücken (Prussia).

By this invention, instead of having the cover raised or lowered by hand, it is brought down automatically, being raised by the action of the fe

et upon a lever on the floor, and closing by itself when the pressure is removed.

1,272, Improvements in Wash-out Closets. P. G. Hubert.

With the soil or waste pipe of the closet, which is the subject of this patent, is combined a basin which has an outlet arranged to discharge into the said soil or waste pipe, and which is mounted on trunnions and pivoted so as to swing in a vertical plane for producing its discharge. The basin itself comprises a partition, the lower edge of which is sealed by the water within the bowl or basin, and forming upon one side of the partition a receptacle or cavity for soil, and upon the other side, behind the soil receptacle, a reservoir or cavity for a clean flushing supply, communication between the two being made below the partition. The object of this is to ensure clean flushing water and a complete wash out of the pan.

NEW APPLICATIONS FOR PATENTS.

March 31.—4,868, T. Wilson, Water Taps.—4,870, J. Brown and W. Mackenzie, Door Springs.—4,876, H. Bromhead, Attaching Knobs to Spindles.—4.877, J. Prince, Metallic Dies for Brick and Tile Making.—4,888, F. Tunettini, Endless Saws for Cutting Stone.—4,900, H. Lake, Weather Strips for Doors, Windows, &c.—4,908, W. and W. Cowan, Flushing Cisterns.

April 3.—4,947, T. Bailey, Fireproof Partition.

April 5.—5,074, J. Wilson, Walls, Buildings, &c.—5,079, J. Birkett, Paving Blocks for Street Crossings and Gutters, and Composition of Waste Materials to be used for same; also Blocks for Paving and Rough Building purposes.

PROVISIONAL SPECIFICATIONS ACCEPTED.

446, J. Cochrane, Water Waste Preventer.—451, J. Cochrane, Double Flush Water Waste Preventer.—3,144, H. Watkinson and H. Partington, Combined Grinding and Brick-making Machine.—3,200, S. Cravos, Windows and Casements.—3,306, H. Carter and J. Aynsley, Spring Hinges or Pivots for Doors, &c.—3,513, W. Rigley, Dressing, Grinding, or Cutting Stone, and for Cutting or Forming a Moulding Edge.—3,516, C. Brothers, Ventilators.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

4,773, A. Boult, Door Checks and Closers.—6,701, B. Thwaite and Others, Portland Cement.—7,389, R. Fladgate, Securing Double Doors, Panels, &c.—7,517, T. Tyzack, Saws.—7,954, E. Anthony, Flushing Sewers and Drains.—8,031, R. Gould, Distempering Composition.—10,034, R. Smith, Chimney Pots.—15,889, T. Grimbleby, Double Bar Lock Roofing Tile.—16,916, G. Smith, Disinfecting Water-closets.—3,156, H. Lawrance, Chimney Cowl and Exhaust Ventilator.—3,412, H. Birkbeck, Illuminated Wind Vanes.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

APRIL 4.

By J. BAKER & SONS.

Harrow-road—1, Waverley-terrace, 61 years, ground-rent 5*l.*	£215
3, Waverley-terrace, 61 years, ground-rent 5*l.*	215

By COLLETT & COLLETT.

Paddington—203, Shirland-road, house and shop, leasehold	1,000

APRIL 5.

By H. YOUNG & CO.

Cambridge Heath—36, North-street, freehold	260
Kingsland—61 and 63, Appleby-street, 16 years, ground-rent 4*l.*	260

By NEWBON & HARDING.

Highgate—Fourteen copyhold cottages	1,000
North Hill—North Hill Villa, copyhold	555
1 to 4, Prospect Cottages, copyhold	800
Clerkenwell—47, Myddelton-street, 24 years, ground-rent 4*l.*	310
Chiswick—471, High-road, 73 years, ground-rent 1*l.*	725
Islington—435, Liverpool-road, 16 years, ground-rent 8*l.*	140

By TOBIN & SON.

Fulham—51, Breer-street, 90 years, ground-rent 3*l.* 10s.	190

APRIL 6.

By TOPLIS & HARDING.

Upper Holloway—156, Corbyn-street, 82 years, ground-rent 6*l.* 6s.	270

MEETINGS.

SATURDAY, APRIL 14.

St. Paul's Ecclesiological Society.—Visit to the Church of St. Mary Overie (St. Saviour, Southwark). 3·30 p.m.

MONDAY, APRIL 16.

Liverpool Architectural Society.—Mr. F. Vacher, M.D., on "Defects in Plumbing and Drainage Works." 7 p.m.

Surveyors' Institution.—8 p.m.

TUESDAY, APRIL 17.

Royal Institution.—Dr. Charles Waldstein on "John Ruskin."—II. 3 p.m.

Institution of Civil Engineers.—(1) Further discussion on Mr. A. Ayres's paper on "Compressed Oil-Gas, and its Applications." (2) Mr. E. B. Ellington on "The Distribution of Hydraulic Power in London." 8 p.m.

Society of Arts (Foreign and Colonial Section).—Mr. W. F. Buchanan on "A Hundred Years' Progress in New South Wales." 8 p.m.

Parkes Museum (Lectures for Sanitary Inspectors).—Dr. Louis Parkes on "Water Supply, Drinking Water, Pollution of Water." 8 p.m.

Statistical Society.—7.45 p.m.

WEDNESDAY, APRIL 18.

British Archæological Association.—(1) Mr. C. Roach Smith, F.S.A., on "The Roman Walls of Dax." (2) Mr. R. Mann on "The Recently-discovered Roman Villa at Tockington." 8 p.m.

Royal Meteorological Society.—Four papers will be read. 7 p.m.

Builders' Foremen and Clerks of Works' Institution.—Quarterly Meeting. 8·30 p.m.

Finsbury Technical College.—Conference on Technical Instruction for Tinplate and Zincworkers, Coppersmiths, and others. 7·30 p.m.

THURSDAY, APRIL 19.

Parkes Museum.—Mr. Justice Cunningham on "The Public Health in India." 5 p.m.

Society of Antiquaries.—8·30 p.m.

Edinburgh Architectural Association.—Mr. J. Crabb Watt, F.S.A., on "The Æsthetics of City Building." 8 p.m.

FRIDAY, APRIL 20.

Architectural Association."—Mr. F. R. Farrow on "Greek Mouldings." 7·30 p.m.

Parkes Museum (Lectures for Sanitary Inspectors).—Mr. E. C. Robins, F.R.I.B.A., on "Drainage and Construction." 8 p.m.

Institution of Civil Engineers (Students' Meeting).—Mr. D. S. Capper, M.A., on "The Speed Trials of the latest Addition to *The Admiral* Class of British Warvessels." 7·30 p.m.

SATURDAY, APRIL 21.

Edinburgh Architectural Association.—Visit to the Forth Bridge.

Miscellanea.

The Asphalte Pavements of Berlin.—The annual reports published by the municipality of Berlin afford some interesting reading with regard to the cost, &c., of the asphalte paving in that city since its introduction. The first experiments with Val de Travers asphalte were made in 1873. These proving satisfactory, a commencement on a small scale was made in 1877, when 2,556 square mètres were laid down. From that year the extension of asphalte pavement grew rapidly. At the end of 1878, 23,586 square mètres of the public streets of Berlin were paved with asphalte; at the close of 1879, 63,258 square mètres; 1880, 106,223 square mètres; 1881, 125,034 square mètres. By April 1, 1883, 187,672 square mètres of asphalte pavement had been laid down; at the same date in 1884, 253,586 square mètres; in 1885, 322,042 square mètres; in 1886, 359,409 square mètres; in 1887, about 412,000 square mètres. At present the superficies of asphalte paving in Berlin is about 470,000 square mètres, and further 76,000 square mètres have been ordered to be executed. The above figures show that asphalte pavement, notwithstanding its reported disadvantages, is in great favour at Berlin, at any rate. As to expense, a square mètre of asphalte paving costs there, on an average, 17 marks 50 pfennigs (17s. 6d.), while the cost of maintenance for twenty years, by contract, is 7 marks 50 pfennigs (7s. 6d.). The total cost per square mètre of asphalte pavement for twenty years is, therefore, 25 marks (1*l.* 5s.). This is only 75 pfennigs (9d.) more per square mètre than the cost of granite pavement. From the report of the municipality of Berlin, it appears that the complaints with regard to the slippery condition of asphalte pavement are gradually disappearing. On the one hand, great improvements, by the light of experience, have been introduced in the treatment of the asphalte; on the other hand, both "drivers and horses are getting more and more used to the new pavement." The cleansing of the pavement also leaves little to be desired, although only forty-five boys are engaged in the work of cleaning nearly 500,000 square mètres.

St. Peter's Church, Blackburn.—The Church of St. Peter, Blackburn, was re-opened on April 1st, after a complete renovation of both the exterior and the interior. A much bolder treatment of colouring has been attempted than usual. The principal contractors have been Mr. E. Wood, of Bradford, for the external pointing, and Messrs. W. & J. Isherwood, of Blackburn, for the internal painting; Messrs. Minton, Hollins, & Co., of Stoke-upon-Trent, for the enriched tile dado to the sanctuary, and Messrs. Heighway & Son, of Manchester, for the decoration of the chancel. The whole work has been carried out from the designs and under the superintendence of Messrs. Simpson & Duckworth, architects, Blackburn.

British Archæological Association.—A meeting of this Association was held on April 4th, Sir J. A. Picton, President, in the chair. Mr. Loftus Brock, F.S.A., announced the progress of the arrangements for holding the congress in the autumn at Glasgow, when visits will be paid to Paisley Abbey, Stirling Castle, Dunfermline, Dunblane Cathedral, and many other places of antiquarian interest in the neighbourhood of the head-quarters. Mr. J. P. Pritchett exhibited photographs of the sculptured stones recently removed from the interior of Croft Church, near Darlington. It had been built up in the masonry, one side only and part of another being visible. The hidden sides, like the portions always visible, proved to be covered with interlaced work and foliage, of very great beauty and artistic design. The stone was a portion of the shaft of a cross, which Mr. Romilly Allen, F.S.A. (Scot.), considered to be of about the seventh century in date. Mr. Thos. Blashill exhibited a large series of views of the ancient monuments of Rome, particularly of the recently-discovered sculptured wall in the Forum. An elaborate and exhaustive paper was then read by Mr. Thos. Morgan, F.S.A., on the recent excavations in the Forum of Rome, and of the present appearance of the ancient ruins, now cleared of the earth in which their bases have been buried for so many centuries. The names and positions of many of the buildings now determined by the recent explorations were particularised and illustrated by extracts from the ancient writers. The temples of the various deities were named, and the comparative ages of the different works were stated. The buildings grouped along the Forum were described under their altered aspects, and it was stated that it is proposed by the Italian Government to clear away the earth, fully 20 ft. deep, which covers the east side of the Forum. The lecture was illustrated by a fine collection of large photographs and etchings. An animated discussion ensued, and the chairman suggested that the name of the Palatine Hill may have been derived from its primitive paling (*palus*, a stake) for defence, erected prior to any masonry walls.

A Fury of the Chemical World.—Three things were sought by the ancient alchemist,—the philosopher's stone, the elixir of life, and the universal solvent. The last of these, though long known to modern chemistry, has just been separated, but cannot be retained, simply because it attacks or destroys everything. This fury of the chemical world, says Mr. W. Mattieu Williams, is the element fluorine; it exists peacefully in company with calcium in fluor-spar, and also in a few other compounds, but, when isolated, as it recently has been by M. Henri Moissan, is a rabid gas that nothing can resist. It combines with all the metals, explosively with some, or if they are already combined with some other non-metallic element, it tears them from it, and takes them to itself. In uniting with sodium, potassium, calcium, magnesium, and aluminium, the metals become heated even to redness by the fervour of its embrace. Iron filings, slightly warmed, burst into brilliant scintillations when exposed to it; manganese does the same. Even the noble metals, which even at a melting heat proudly resist the fascinations of oxygen, succumb to this chemical siren at moderate temperatures. Glass is devoured at once, and water ceases to be water by contact with this gas, which, combining with its hydrogen, at the same moment forms the acrid, glass-dissolving hydrofluoric acid, and liberates ozone.—*Iron.*

National Registration of Plumbers.—The Registration Committee of the Worshipful Company of Plumbers met at the Guildhall on the 4th inst., the Master of the Company (Mr. F. Machin), presiding. The first nominations for registration of plumbers in Edinburgh and the east of Scotland were received from the council recently formed in Edinburgh, under the presidency of Sir Douglas Maclagan, M.D., to extend the registration system in that district of Scotland.

A Conference on Technical Instruction for tin, iron, and zinc-plate workers, coppersmiths, and others (the sixth of the series) will be held at the Finsbury Technical College, Leonard-street, City-road, E.C., on Wednesday next, April 18th, at 7·30 p.m. The discussion will be opened by Mr. C. T. Millis, M.Inst.M.E., Superintendent of the Trade Classes of the college. The chair will be taken by Mr. Hodgson Pratt.

Andaman Padouk Timber.—Messrs. C. Leary & Co., of Old Broad-street, inform us that the barque *Anne Main* left Port Blair on the 11th February, with a cargo of 530 loads of Padouk timber for the London market. Should this timber be sold at remunerative rates regular shipments will be made. This timber is said to be very strong and durable; its weight is 55 lb. to the cubic foot. "It has been used for gun-carriages both in India and in England; furniture made of it was exhibited in Paris in 1878, and since in the Exhibitions in Calcutta, Edinburgh, and London, and was greatly admired. Its handsome appearance (equal, if not superior, to that of mahogany) makes it a suitable wood for furniture, fittings of railway carriages and ships' saloons, and for carriage building, while its great strength and durability recommend it for all constructive purposes, where first-class timber is necessary."

Holden & Co.—We understand that the business of Messrs. Holden & Co., 5, Wood-street, Westminster, zinc, copper, and galvanised iron contractors, has been disposed of, in consequence of the death of Mr. C. Holden, which occurred some months ago. This will make no difference in the management, as Mr. T. W. Allen, who has been associated with the old firm for the last twenty years, will still take the active and responsible management of the same, and the firm will still continue to trade, as before, as Holden & Co.

PRICES CURRENT OF MATERIALS.

TIMBER.	£.	s.	d.	£.	s.	d.
Greenheart, B.G. ....ton	6	10	0	7	15	0
Teak, E.I. ....load	8	0	0	12	10	0
Sequoia, U.S. ....foot cube	0	2	3	0	3	0
Birch, Canada....load	2	15	0	4	15	0
Fir, Dantsic, &c.	2	0	0	4	0	0
Oak ,, ...	2	0	0	4	10	0
Canada	4	0	0	6	10	0
Pine, Canada red	2	10	0	3	10	0
,, yellow	2	10	0	4	0	0
Lath, Dantsic ....fathom	3	10	0	5	0	0
St. Petersburg	5	0	0	6	0	0
Wainscot, Odessa, crown....	2	10	0	3	0	0
Deals, Finland, 2nd and 1st...std.100	8	0	0	9	10	0
,, 4th and 3rd	6	10	0	7	10	0
Riga	6	0	0	7	10	0
St. Petersburg, 1st yellow	9	10	0	14	10	0
,, 2nd ,, ...	8	0	0	9	0	0
,, white	7	0	0	10	0	0
Swedish	7	0	0	15	10	0
White Sea	8	0	0	17	0	0
Canada, Pine, 1st	16	0	0	24	0	0
,, ,, 2nd....	10	0	0	15	10	0
,, ,, 3rd, &c....	7	0	0	9	10	0
,, Spruce, 1st	8	0	0	9	10	0
,, ,, 3rd and 2nd.....	6	0	0	7	10	0
New Brunswick, &c....	6	10	0	7	5	0
Battens, all kinds	4	10	0	11	0	0
Flooring Boards, sq., 1 in., prepared, First	0	10	0	0	12	0
Second	0	7	6	0	9	6
Other qualities	0	4	6	0	6	6
Cedar, Cuba ....foot	0	0	3½	0	0	4
Honduras, &c.	0	0	3½	0	0	3½
Australian	0	0	2½	0	0	3½
Mahogany, Cuba	0	0	4¼	0	0	7
St. Domingo, cargo average	0	0	4½	0	0	6
Mexican ,, ...	0	0	4	0	0	4½
Tobasco ,, ...	0	0	4	0	0	5½
Honduras ,, ...	0	0	4½	0	0	5½
Rose, Rio ....ton	8	0	0	11	0	0
Box, Turkey	5	0	0	12	0	0
Walnut, Italian ....foot	0	0	4	0	0	5½
METALS.						
IRON—Bar, Welsh, in London...ton	4	15	0	4	17	6
,, ,, in Wales	4	12	6	4	15	0
,, Staffordshire, London	5	10	0	7	0	0
COPPER—						
British, cake and ingot ....ton	79	0	0	0	0	0
Best selected	80	0	0	0	0	0
Sheets, strong....	90	0	0	0	0	0
Chili, bars	80	5	0	80	15	0
YELLOW METAL....lb.	0	0	7½	0	0	7½
LEAD—						
Pig, Spanish ....ton	14	0	0	0	0	0
English, common brands....	14	5	0	14	10	0
Sheet, English	15	5	0	15	10	0
SPELTER—						
Silesian, special ....ton	18	10	0	18	15	0
Ordinary brands....	18	5	0	18	10	0
TIN—Straits ....ton	168	0	0	0	0	0
Australian	166	0	0	0	0	0
English ingots	157	0	0	0	0	0
ZINC—						
English sheet ....ton	22	0	0	23	0	0
OILS.						
Linseed ....ton	18	12	6	18	15	0
Cocoanut, Cochin	27	10	0	29	0	0
Ceylon	24	5	0	0	0	0
Palm, Lagos	21	0	0	21	10	0
Rapeseed, English pale	23	10	0	24	0	0
,, brown	22	10	0	23	12	6
Cottonseed, refined	20	15	0	0	0	0
Tallow and Oleine....	25	0	0	45	0	0
Lubricating, U.S....	5	0	0	6	0	0
,, refined....	5	0	0	12	0	0
TURPENTINE—						
American, in casks ....cwt.	1	8	6	0	0	0
TAR—						
Stockholm ....barrel	0	15	0	0	15	6
Archangel	0	10	0	0	10	6

TENDERS.

[Communications for insertion under this heading must reach us *not later than* 12 *Noon on Thursdays.*]

BATTERSEA.—For the erection of the Battersea Public Baths. Mr. Rowland Plumbe, Mr. Horace T. Bonner, and Mr. Charles Jones, joint architects. Quantities by Messrs. Hunt & Steward:—

King & Son	£13,200	0	0
J. O. Richardson	12,210	0	0
Goodman	11,777	0	0
Wood....	11,753	0	0
Allan	11,690	0	0
Bottoms....	11,500	0	0
Gregory....	11,447	0	0
Lacy Bros.	11,130	0	0
G. Howard	11,058	0	0
Turtle & Appleton....	11,080	0	0
Dickinson....	10,980	0	0
Wall	10,880	0	0
Gentry	10,875	0	0
Kirk & Randall	10,730	0	0
J. T. Chapple	10,723	0	0
Nightingale	10,680	0	0
W. Downs	10,662	0	0
Stevenson	10,558	0	0
H. L. Holloway	10,447	0	0
Higgs....	10,400	0	0
Hart	10,344	0	0
Jerrard	10,333	0	0
W. Johnson....	10,300	0	0
Holloway Bros.	10,290	0	0
J. Holloway (accepted)	10,180	0	0
Parker	9,888	0	0

BEDFORD.—For the erection of lodge at recreation ground, for the Urban Sanitary Authority of the borough of Bedford. Mr. John Lund, Surveyor:—

Joseph Francis....	£565	0	0
Fredk. Knight	495	14	11
R. R. H. Melcombe....	495	0	0
Chas. Dennis....	488	10	0
Geo. Harrison	477	0	0
Geo. Todd	475	0	0
Warton & Walker	473	0	0
Freshwater & Sons	471	9	0
Will. Haynes....	459	0	0
Thos. Laughton	452	0	0
John P. White....	447	0	0
Samuel Foster	443	0	0
Chas. Carter	435	0	0
John Smith	432	0	0
John Corby & Son	417	0	0
Coleman & Fathers....	400	0	0
H. W. Ager (accepted)	399	10	0

BETHNAL GREEN.—For erecting the Three Loggerheads Tavern, Virginia-road, Bethnal-green. Messrs. W. F. Meakin & Son, architects:—

Williams....	£4,062	0	0
Colls & Son	3,943	0	0
Patman & Fotheringham	3,773	0	0
Lawrence & Son	3,679	0	0
Scrivener & White	3,647	0	0
Jackson & Todd, Hackney-road* ...	3,495	0	0

* Accepted.

BLAENAVON (Mon.).—For alterations and additions to Broad-street Baptist Chapel. Messrs. Habershon & Fawckner, architects, Park-square, Newport, Mon.:—

J. Foster	£842	0	0
Morgan & Evans	797	0	0
Evan Davies	735	0	0
Burgoyne (accepted)	675	0	0

CHELSEA.—For building new post-mortem room and disinfecting chamber at the Infirmary, Cole-street, Chelsea, for the Vestry. Messrs. A. & C. Harston, architects. No quantities supplied:—

Cox, Battersea....	£497	15	0
Wade, Flood-street....	494	0	0
Johnson, Wandsworth Common	490	0	0
J. Jones, Sydney-street....	464	0	0
Idle, Clapham	410	0	0
A. & E. Braid, Chelsea (accepted) ...	395	0	0

CLAYGATE (near Esher).—For building new warehouse and stable at Claygate, for Mr. W. C. Tyte. Mr. G. Stearman, architect:—

Adkins Bros....	£375	0	0
C. Adkins	350	0	0
Constable	338	0	0
Callingham (accepted)	317	0	0

COVENTRY. — For five houses, Weston-street, Coventry, for Mr. James Arch, sen. Mr. E. J. Purnell, architect and surveyor:—

Barker	£775	0	0
Wilkins	740	0	0
Haywood	740	0	0
Worwood	737	0	0
Heatherley Bros.	717	0	0
Waters	702	0	0
Mayo	700	0	0
Liggins	693	0	0
Wincott	689	0	0
Wootton....	677	0	0
Garlick	670	0	0
Blakeman	650	0	0
Isaac, Feleshill (accepted)	625	0	0

CROYDON.—For the erection of a warehouse at South End, Croydon, for Messrs. Cooper. Mr. Fred. West, architect. No quantities supplied:—

Marriage....	£4,475	0	0
Burman & Son	4,231	0	0
Page....	4,200	0	0
Smith & Son	4,187	0	0
Bowyer & Son	4,160	0	0
Taylor	4,075	0	0
J. O. Richardson....	3,870	0	0
Bryan	3,565	0	0

ENFIELD.—For building and completion of two semi-detached villas, for Messrs. Graves & Co., Enfield:—

O. Sanders & Sons	£436	0	0
S. T. White	421	0	0
Harrison & Crabb (accepted)	409	0	0
J. Healey	394	0	0

EXETER.—For new business premises in Fore-street, for Mr. J. T. Trimble. Messrs. Wilkinson & Warren, architects, Exeter. Quantities supplied:—

Vicary	£1,100	0	0
Stephens....	1,078	0	0
Phillips (accepted)	975	0	0

[All of Exeter.]

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Plan of a Main Intercepting Sewer, &c.	Otley-in-Wharfedale L B	105*l.*	June 1st	ii.
Designs for Cottage Homes, &c.	Wolverhampton Grdns.	Not stated	June 14th	ii.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Re-gravelling a Footpath, Hampstead Heath	Met. Board of Works...	*Official*	April 17th	ii.
Repairing and Painting Railings	do.	do.	do.	ii.
Paving Courtyard, Apothecaries' Hall	.....	R. H. Davies	do.	viii.
Railway Stores	L. B. & S. C. Ry. Co....	*Official*	April 18th	ii.
Erection of Pair of Villas	.....	C. Jones	April 19th	viii.
Wood Pavement	Folkestone Cor.	A. W. Conquest	April 20th	ii.
New Sewers	St. Giles's Brd. of Wks	G. Wallace	April 23rd	ii.
Painting and Repairing	Hornsey Local Board ...	T. De Courcy Meade ...	do.	viii.
Wrought-Iron Unclimbable Railing	Hendon Local Board ...	S. S. Grimley	do.	viii.
Repairs to Side Entrance Covers	St. George the Martyr, Southwark	*Official*	April 24th	ii.
New Station, Midgham	Great Western Ry. Co.	do.	do.	ii.
Kerbing, &c.	Eastbourne Town Cncl.	C. Tomes	do.	viii.
Construction of New Road	South Acton Estate	.....	April 25th	ii.
Road-making and Paving Works	Hammersmith Vestry...	*Official*	do.	viii.
New Wards at Infirmary	Kensington Guardians	H. H. Bridgman	April 26th	viii.
Road Materials, &c.	Barnet Local Board.....	W. H. Mansbridge	April 27th	ii.
Broken Granite	Canterbury Cor.	*Official*	do.	viii.
Asphalte Tar Paving	Walthamstow Local Bd.	H. S. Ridings	do.	viii.
Making-up Roads	do.	do.	do.	viii.
Enlargement, South Kensington P.O.	Com. of H.M. Works...	*Official*	May 1st	viii.
Enlargement and Additions to Schools, &c.	School Brd. for London	do.	Not stated...	viii.
New Wing to School, Middlesbrough	.....	A. Waterhouse	do.	viii.
Girls' Home at Woodford	Rescue Soc. for Women	E. Tidman	do.	viii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page
Engineer and Architect's Chief Assistant	York Corporation.....	120*l.*	April 23rd	xiv.
Assistant Clerk of Works	South Met. School Bd.	2*l.* per week	do.	xiv.

DORKING.—For house connexions throughout the district, under a schedule of prices. Mr. G. Somers Mathews, Surveyor to the Local Board :—

J. Bloomfield, Tottenham, lowest, accepted.

[Seven other tenders.]

DULWICH.—For works at Nos. 7 and 9, Maxted-road, and 34, Costa-street, East Dulwich. Mr. R. A. Lewcock, architect, 88, Bishopsgate-street Within :—

Spencer & Co.	£189	0	0
Steel Bros.	177	10	0
J. Ivory	164	10	0
F. Dawes	148	0	0
W. Wythe	145	0	0
C. Bawden	134	2	6
S. Bartram	110	0	0

GREENWICH.—For pulling down and rebuilding the Rose and Crown public-house, Groom's Hill and Silver-street. Mr. Frank Matcham, architect. Quantities by Mr. Frederick Thomson:—

	Building.	Fittings.	Total.
Dove Bros.	£1,953	£215	2,168
Morter	1,934	213	2,147
Colls & Sons	1,932	210	2,142
Patman & Fotheringham.	1,897	209	2,106
Toms	1,869	194	2,063
Kirk & Randall	1,811	183	1,994
Holloway	1,817	160	1,977
Burman & Sons	1,797	165	1,962

GREENWICH.—For additions to the Greenwich Union Laundry, for the Board of Guardians. Mr. Thomas Dinwiddy, architect. Quantities by Mr. W. E. Stoner :—

Ward, Clarke, & Co.	£2,323	0	0
Staines & Son	2,244	0	0
Kirk & Randall	2,210	0	0
Balsam Bros.	2,148	0	0
D. & R. Kennard	2,116	0	0
Killby & Gayford	2,094	0	0
S. J. Jerrard	2,065	0	0
Thos. Knight	2,062	0	0
F. P. Smith	1,952	0	0
W. Downs	1,928	0	0
J. O. Richardson	1,909	0	0
H. L. Holloway	1,890	0	0
T. D. Leng	1,855	0	0
S. Schofield, 42, Evelyn-street, Deptford (accepted)	1,841	0	0

[Architect's estimate, £1,950.]

HAMMERSMITH.—For alterations, &c., required to be done at the Dartmouth Castle, Glenthorne-road, Hammersmith, for Mr. W. Robertson. Mr. H. I. Newton, architect, 17, Queen Anne's-gate, Westminster :—

Sykes & Son, Essex-street, Strand*	£413	0	0
Pewterer's Work.			
Sanders & Son, Oxford-street*	65	5	0

* Accepted.

HAMPSTEAD.—For villa residence, West Hampstead. Mr. Banister Fletcher, architect :—

Neave & Neave	£1,625	0	0
W. Smith	1,547	0	0
C. J. Bursill	1,537	0	0
W. Tout (accepted)	1,295	0	0

HAMPSTEAD.—For completion of "The Turret," Chislett-road, West Hampstead. Mr. Banister Fletcher, architect :—

C. J. Bursill	£887	0	0
W. Smith	668	0	0
W. Tout (accepted)	590	0	0

HASTINGS. — For erecting Emmanuel Vicarage, Hastings. Messrs. W. Hay & J. D. Murray, architects, Hastings :—

Thos. Salter	£1,755	0	0
W. E. Warman	1,750	0	0
P. & P. Phillips	1,698	10	0
Wm. Comport	1,655	0	0
P. Jenkins	1,640	0	0
Wm. Small	1,612	17	10
Chas. Burden	1,605	0	0
H. E. Crittenden	1,583	0	0
Eldridge & Crittenden	1,547	0	0
C. & E. Hannan*	1,470	0	0

* Accepted subjected to modifications.

HORSHAM.—For rebuilding the chancel of St. Mark's Church, Horsham, for the Rev. E. Wills and the Committee. Mr. E. P. Loftus Brock, F.S.A., architect :—

Dewdney Bros.	£1,191	0	0
Rowland Bros.	1,170	0	0
Etheridge Bros.	1,157	0	0
Peters	945	0	0

[All of Horsham.]

KINGSTON-ON-SOAR (Notts).—For the erection of a gypsum mill, for the Right Hon. Lord Belper. Mr. Henry Hall, architect, Doughty-street, London. Quantities supplied by the architect :—

Gibson, Southall	£3,245	0	0
Dennett & Ingle, Nottingham	3,190	0	0
Bramley, Kegworth	3,134	0	0
Warren, Leicester	3,070	0	0
Faulks, Loughborough	2,667	0	0
Slater, Ashby-de-la-Zouch	2,665	0	0
Black, Barrow-on-Soar	2,658	0	0

LONDON.—For works at 10 and 11, Warwick-lane. Mr. Delissa Joseph, architect, 17, Basinghall-street, E.C. :—

Portland and Westwood Stone Front.

F. J. Barnes	£291	14	0
G. J. Brown	290	0	0
G. Seale	285	0	0
G. Herridge*	270	0	0

* Accepted at reduced price, £255.

Cast and Rolled Ironwork.

M. Shaw & Co.	£227	0	0
Measures Bros. & Co. (accepted)	203	4	6

LONDON.—For rebuilding Nos. 13 and 14, Argyll-street, Regent-street, W., for Mr. Peter Robinson, exclusive of works previously done by day account, and of the internal arrangements and fitting-up of the premises, to form subsequent contracts. Mr. John Mackland, A.R.I.B.A., architect :—

In conformity with form of tender.

	Complete within 10 weeks.	Complete within 8 weeks.
Hall, Beddall, & Co.	£4,336	—
Simpson & Son	4,200	4,500
W. Brass & Son	4,137	4,349
Colls & Sons	4,100	4,300
Peto Bros.	4,082	—
William Downs	3,985	4,235
Higgs & Hill*	3,980	4,200
Stimpson & Co.	3,980	4,050
Not in conformity with form of tender.		
W. Oldrey & Co. (within 16 weeks)	£4,428	0 0
J. & J. Greenwood (within 13 weeks)	4,120	0 0
Patman & Fotheringham (within 13 weeks)	3,973	0 0
J. M. Macey & Sons (no time stated)	3,909	0 0

* Accepted for 10 weeks.

LONDON.—For the rebuilding of No. 24, Austinfriars, E.C., for Messrs. Johnson, Budd, & Johnson. Mr. Ebenezer Gregg, architect, 1A, St. Helen's-place, E.C. Quantities by Messrs. S. Young & Brown :—

Holland & Hannen	£11,450	0	0
Trollope & Sons	10,937	0	0
S. H. & A. Bywaters	10,342	0	0
Hall, Beddall, & Co.	9,948	0	0
W. Shepherd	9,840	0	0
B. E. Nightingale	9,774	0	0
Patman & Fotheringham	9,737	0	0
L. H. & R. Roberts	9,647	0	0
Ashby & Horner (accepted)	9,549	0	0

LONDON.—For alterations on second and third floors at 292, High Holborn, to form residential chambers. Mr. C. Reilly, architect :—

	Second Floor.	Third Floor.	Total.
Harris & Spooner	£747	£337	£1,084
Staines & Son	698	329	1,027
Lidstone	706	310	1,016
Gaisford	660	323	983
Ashby Bros.	632	288	920
Norton & Son	630	286	916

LONDON.—For alterations at No. 32, Fore-street, for Mr. Lake. Mr. F. Hammond, architect :—

		Extra if Portland front.
Lawrence	£1,645 0	55 0
Dove Bros.	1,415 0	62 10
Larke & Sons	1,340 0	60 0
Exton & Burton	1,299 0	55 0
Sheppard	1,276 0	21 0
B. Hasegood	1,029 0	37 0

LONDON.—For improvements at the Lord Nelson tavern, Old Kent-road. Mr. R. A Lewcock, architect, 88, Bishopsgate-street Within :—

F. Dawes	£482	0	0
Warne	445	0	0
J. Walker	385	0	0
W. H. Bright	360	0	0
W. Wythe	350	0	0
Spencer & Co.	345	0	0
Steel Bros.	340	0	0

LONDON. — For erecting premises, No. 8, Great Portland-street, for Madame Elliot. Mr. Albert Vicars, architect, 151, Strand :—

Kelly & Son	£1,891	3	0
T. Heath	1,885	0	0
H. Tarrant	1,795	12	11
Oldrey & Co., Carlton Bridge, Westbourne Park (accepted)	1,795	0	0

LONDON.—For works at the Bull Inn, tavern, High-street, Kingsland. Messrs. Bird & Walters, architects :—

Mark	£730	0	0
Pepper & Co.	695	0	0
Shurmur	693	0	0
Burman & Son	690	0	0
Goodall	679	0	0
Jackson & Todd	590	0	0
Mower	566	0	0

LONDON.—For works at the Coopers' Arms, Hampden-street, Somers Town. Messrs. Williams & Son, architects :—

Staines & Son	£540	0	0
Jackson & Todd, Hackney-road*	514	0	0

* Accepted.

LONDON.—For alterations for Messrs. Windover, Nos. 175 and 176, New Bond-street. Mr. John Mackland, architect :—

Bulman & Dales	£358	0	0
Tomkins	340	0	0

LONG DITTON (Surrey).—For house at Long Ditton, for Mr. C. L. Lavers-Smith. Messrs. Hammack & Lambert, architects :—

J. H. Jarvis	£2,737	0	0
W. & A. Brown	2,640	0	0
F. Peters	2,621	0	0
H. Faulkner	2,486	0	0

NEWPORT (Mon.).—For re-pewing a portion of St. Paul's Church, together with new pulpit and reading-desk. Messrs. Habershon & Fawckner, architects, Newport :—

J. Linton (accepted)	£270	0	0

NOTTINGHAM.—For a new Science Class Department to All Saints' Church Schools, Forest-road, West Nottingham. Mr. Frederick Jackson, C.E., architect, 18, Low Pavement, Nottingham. Quantities supplied by the architect :—

Saml. Hind	£694	0	0
Bell & Son	651	0	0
S. & J. Cargill	640	0	0
A. B. Clarke	600	0	0
John Cooper, Forest-road West (conditionally accepted)	576	0	0

[All of Nottingham.]

[Architect's estimate, £633.]

NOTTINGHAM.—For a new room to the Girls' Orphanage, Friar-street, Lenton, Nottingham. Mr. Fred. Jackson, C.E., architect, 18, Low Pavement, Nottingham. Quantities supplied by the architect :—

Wm. Woodsend	£324	0	0
H. & W. Butler	302	0	0
Bell & Son	284	6	0
S. & J. Cargill, 42, Duke-street, New Basford (accepted)	281	13	6

[Architect's estimate, £285.]

RICKMANSWORTH (Herts).—For alterations and additions to the Swan Hotel. Mr. C. P. Ayres, architect, Watford :—

Thos. Turner, Limited, Watford	£777	10	0
G. & J. Waterman, Watford	747	0	0
Brown & Sons, Harefield (accepted)	698	0	0

THAMES DITTON.—For alterations, &c., to the Angel Inn, Thames Ditton, for the Kingston Brewery Company :—

Wells	£422	0	0
Callingham	380	0	0
Adkins (accepted)	345	0	0

TWICKENHAM.—For alterations and repairs to villas and cottages, for Mr. Martin Seal. Mr. H. Orme, surveyor :—

J. J. Osbourn	£1,340 0 0
W. Lasscock	1,269 0 0
Geo. Grossmith	1,233 0 0
F. C. Green	1,150 0 0
W. Buckeridge	993 0 0
W. Coates	972 11 6
J. Hobern	955 0 0
J. Pyett	925 0 0
James Hill	890 0 0
M. Bates	879 0 0
Foster & Gifkins	836 0 0
J. Stafford	781 0 0
W. Macey	740 0 0
D. R. Boyd	686 0 0
G. Couzin & Co.	654 0 0
John Dawson	565 0 0
James Crawford	530 0 0
James Earl (accepted)	480 0 0

WATFORD (Herts.)—For new warehouses, &c., for Messrs. Henry Kingham & Sons. Mr. C. P. Ayres, architect, Watford :—

Thos. Turner, Limited	£994 10 0
G. & J. Waterman	947 0 0
Clifford & Gough (accepted)	930 0 0

WATFORD.—For new kitchen and bakehouse, for Mr. P. Buck. Mr. C. P. Ayres, architect :—

Clifford & Gough	£690 0 0
Thos. Turner, Limited	685 0 0
Andrews & Sons (accepted)	657 0 0

WATFORD.—For alterations at No. 35, High-street, for Mr. S. Ruff. Mr. C. P. Ayres, architect :—

Thos. Turner, Limited	£316 0 0
Clifford & Gough	309 15 0
G. & J. Waterman	286 0 0
Andrews & Sons (accepted)	277 0 0

WATFORD.—For new shop-fronts, No. 127, High-street, Watford, for Messrs. W. E. Pearkes & Sons, drapers. Mr. W. Ayres, architect :—

W. Salter	£236 18 0

[No competition.]

WESTMINSTER. — For rebuilding No. 10, Little Queen-street, Westminster, for Dr. Williams's Trust. Messrs. T. Chatfeild Clarke & Son, architects. Quantities by Messrs. Leonard & Clarke :—

		Extra for Party-wall.
Musto	£1,483 15	£110 18
Goodall	1,216 0	96 0
Titmas	1,200 0	106 0
Money Marsland	1,098 0	95 0
Parker	1,093 0	86 0
Killby & Gayford	1,020 0	98 0
Exton & Burton	1,009 0	85 0
Cox	976 0	80 0

WESTON-SUPER-MARE.—For the carpenter and joiners' work to two houses in Walliscote-road, Weston-super-Mare. Messrs. Lingen-Barker & Cross, architects :—

	Labour and Materials.	Labour only.
F. & G. Marshall	£329	—
Durston	235	£90 0
Pollard	—	88 10
Chapman	—	84 10
Rowsell (accepted)	—	66 10

WOKING.—For erecting a house, Woking, for Mr. Alfred Lee, of Ripley. Mr. W. J. Chambers, architect, Woking :—

Harris, Woking	£1,755 0 0
Shears, Maybury	1,550 0 0
Ingram, Goldsworth	1,400 0 0
Butt, Woking	1,355 0 0
Seaber, Godalming	1,325 0 0
Gray, Egham	1,325 0 0
Martin, Wells, & Co., Aldershot	1,289 0 0
Watson, Ascot	1,257 0 0
Gale, Woking (accepted)	1,120 0 0

[The above are exclusive of all bricks and cartage.]

WOOLWICH.—For counters, fittings, &c., at new branch stores, Herbert-road, Plumstead, for the Committee of the Royal Arsenal Co-operative Society. Mr. J. O. Cook, architect, 1a, Eleanor-road, Woolwich :—

Taylor	£205 0 0
Lascelles	190 0 0
W. Salter (accepted)	186 0 0

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F. T. Y. (we cannot go into the question).—M. & Co.—J. W. B.—F. E. (we can hardly go into the subject further).—W. H. S.—J. O. R. (one of the lists you send was published by us a fortnight ago).—Lists of tenders received too late for this week from E. B., & G. St. P. H.

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication

We are compelled to decline pointing out books and giving addresses.

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news-items) which have been duplicated for other journals, are NOT DESIRED.

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